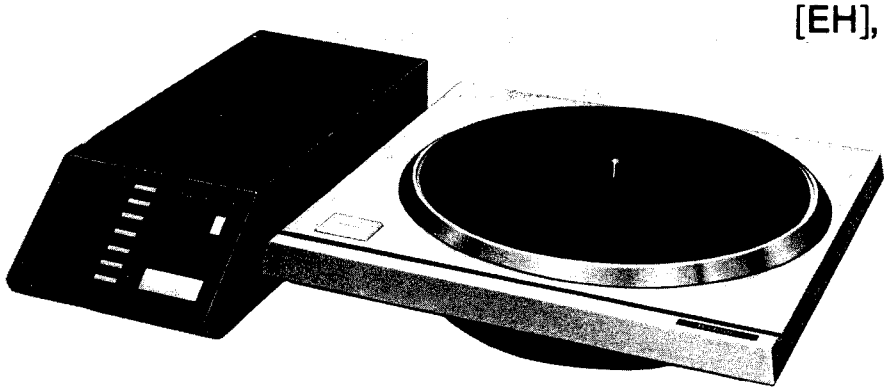
Service Manual

QUARTZ Direct Drive Turntable

SP-10MK3

[E], [EK], [XL], [EG], [EB],
[EH], [EF], [Ei], [EC], [XA], [XM]



Areas

* [E] is available in Switzerland and Scandinavia.
* [EK] is available in United Kingdom.
* [XL] is available in Australia.
* [EG] is available in F.R. Germany.
* [EB] is available in Belgium.
* [EH] is available in Holland.
* [EF] is available in France.
* [Ei] is available in Italy.
* [EC] is available in Czechoslovakia.
* [XA] is available in Southeast Asia, Oceania, Africa, Middle Near East and Central South America.
* [XM] is available in Central South America.

Specifications

Specifications are subject to change without notice for further inprovement.
Weight and dimensions shown are approximate.

■ General

Power supply:	~110/120/220/240V, 50 or 60Hz
Power consumption:	32.5 W
Dimensions (H×W×D):	(Turntable unit) 11.3×36.9×36.9 cm 4-7/16×14-17/32×14-17/32 inches (Control unit) 9.6×16.6×41 cm 3-3/4×6-17/32×16-1/8 inches
Weight:	18 kg (40 lb) (Turntable unit) 6 kg (13 lb) (Control unit)

■ Turntable section

Type:	Direct drive turntable with quartz synthesizer pitch control
Turntable platter:	Copper alloy and die-cast aluminum diameter 32 cm (12-19/32"), weight 10 kg (22 lb)
Moment of inertia:	1.1 ton•cm² (1,100 kg•cm²)
Motor:	Quartz-phase-locked, ultra-low speed, brushless DC motor
Turntable speeds:	33-1/3, 45 and 78.26 rpm
Turntable speed fine adjustment:	Quartz locked, pitch adjustable in 0.1% steps up to ±9.9%
Starting torque:	16 kg•cm
Start-up time:	0.25 s. (33-1/3 rpm)
Braking time:	0.3 s. (33-1/3 rpm)
Speed fluctuation due to load torque:	0% within 10 kg•cm
Speed drift:	Within ±0.001%
Wow and flutter:	0.015% WRMS (JIS C5521) ±0.021% weighted zero to peak (DIN 45500, IEC 98A weighted) (System tested: SP-10MK3+ SH-10B5+EPA-250+ EPC-100CMK3)
Rumble:	−92 dB DIN B (IEC 98A weighted) −60 dB DIN A (IEC 98A unweighted)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

SP-10MK3

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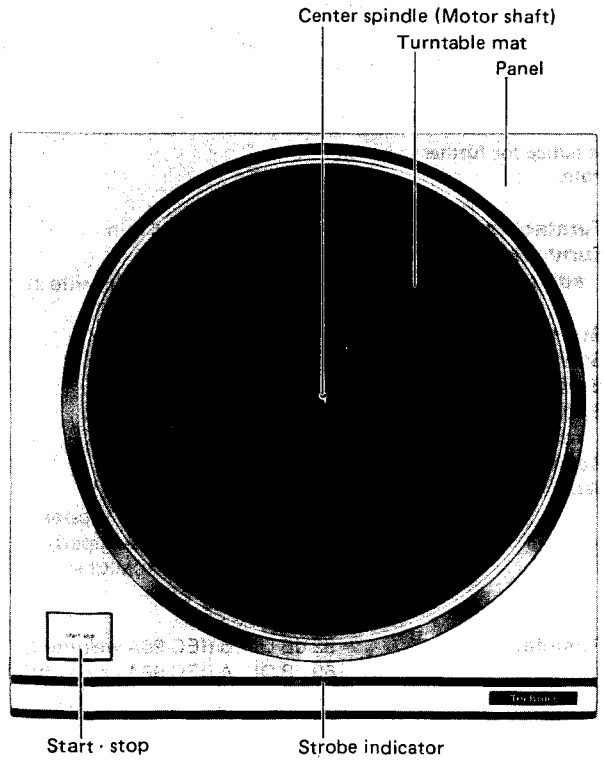
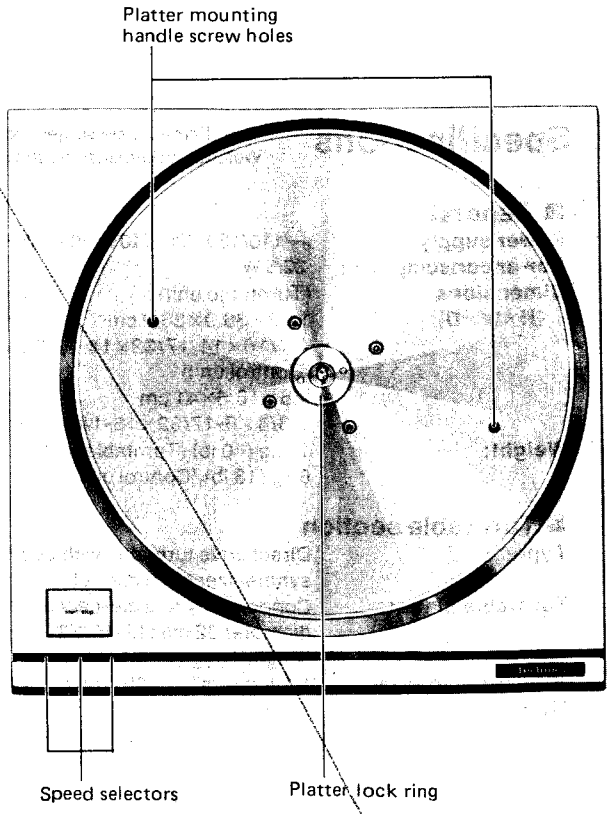
■ LOCATION OF CONTROLS

- Turntable unit





ORDER NO. SD82062239C8

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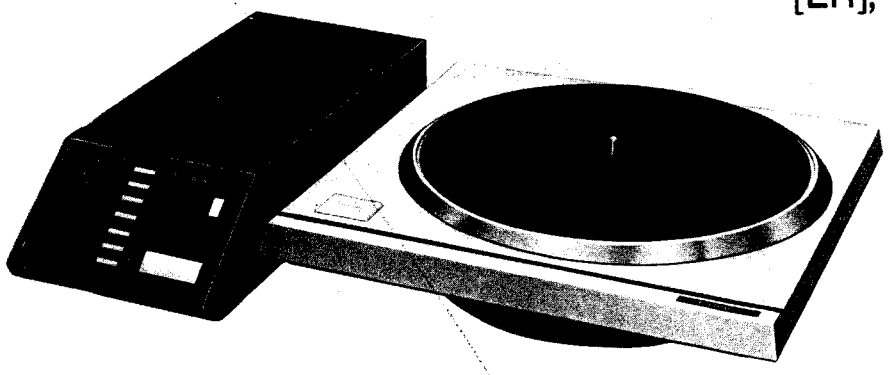

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Turntable speed fine adjustment: Quartz locked, pitch adjustable in 0.1% steps up to ±9.9%
Starting torque: 16 kg•cm
Start-up time: 0.25 s. (33-1/3 rpm)
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Speed drift: Within ±0.001%
Wow and flutter: 0.015% WRMS (JIS C5521)
±0.021% weighted zero to peak (DIN 45500, IEC 98A weighted)
(System tested: SP-10MK3+ SH-10B5+EPA-250+ EPC-100CMK3)
Rumble: −92 dB DIN B (IEC 98A weighted)
−60 dB DIN A (IEC 98A unweighted)

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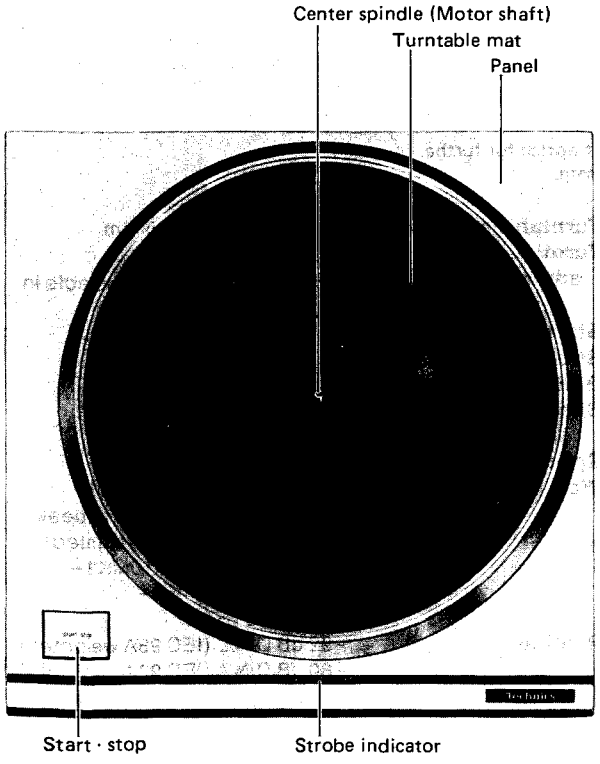
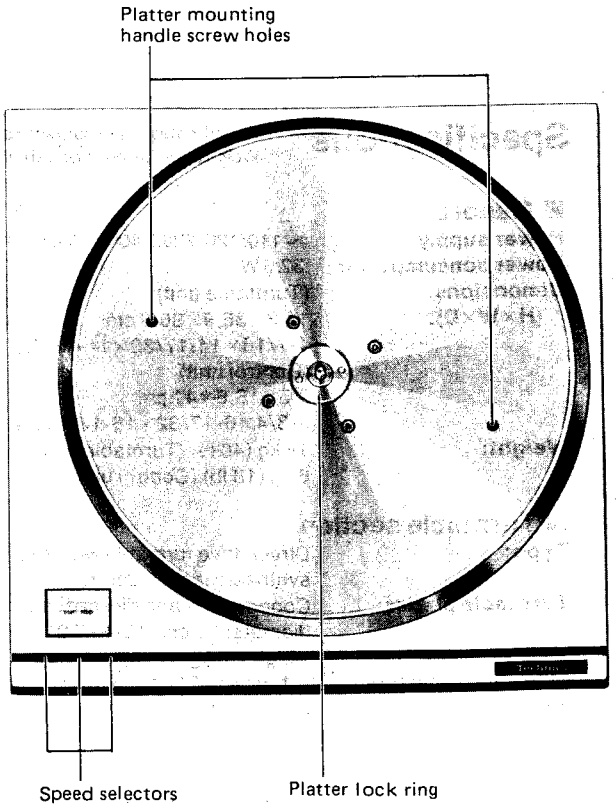
■ LOCATION OF CONTROLS

- Turntable unit





ORDER NO. SD82062239C8-A

DEUTSCH

QUARTZ Direct Drive Turntable SP-10MK3

This booklet contains the specifications and adjusting procedures for SP-10MK3, written in Germany, French and Spanish.
File this manual together with the SP-10MK3 service manual (Order No. SD82062239C8).

DEUTSCH

■ TECHNISCHE DATEN

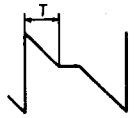
Änderungen der technischen Daten vorbehalten.
Die angegebenen Gewichts- und Abmessungsdaten sind ungefähre Werte.

■ Allgemeine Daten

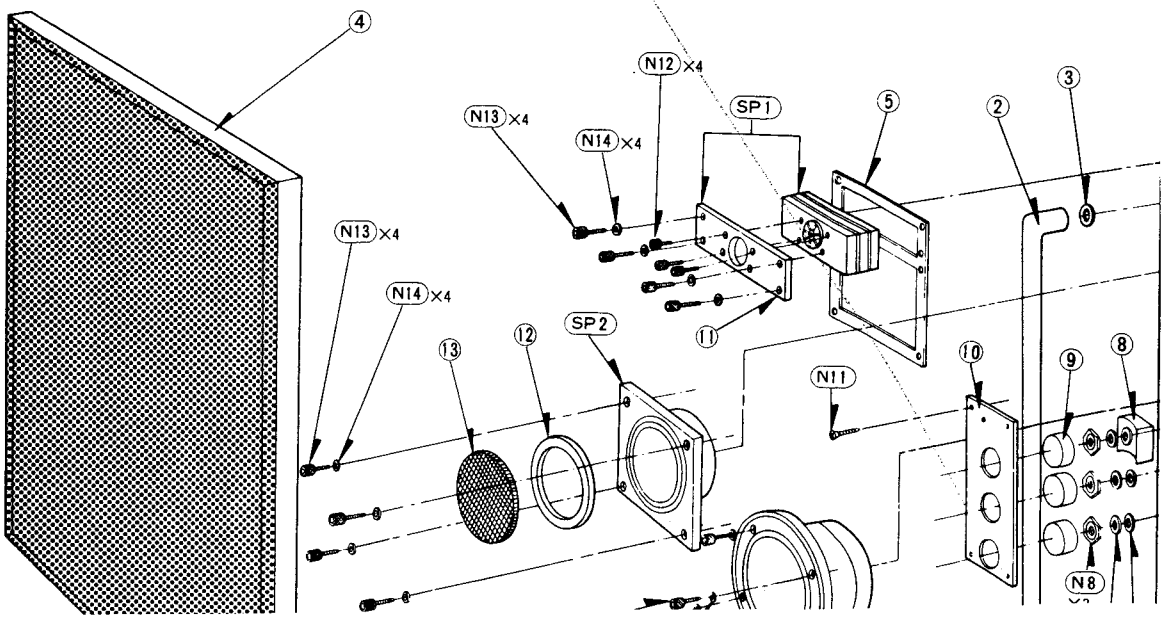
Stromversorgung:	~ 110-120V/220-240V, 50/60Hz, Wechselstrom
Leistungsaufnahme:	32,5 W
Abmessungen (B x H x T):	(Plattenspielereinheit) 11,3 x 36,9 x 36,9 cm (Steuereinheit) 9,6 x 16,6 x 41 cm
Gewicht:	18 kg (Plattenspielereinheit) 6 kg (Steuereinheit)

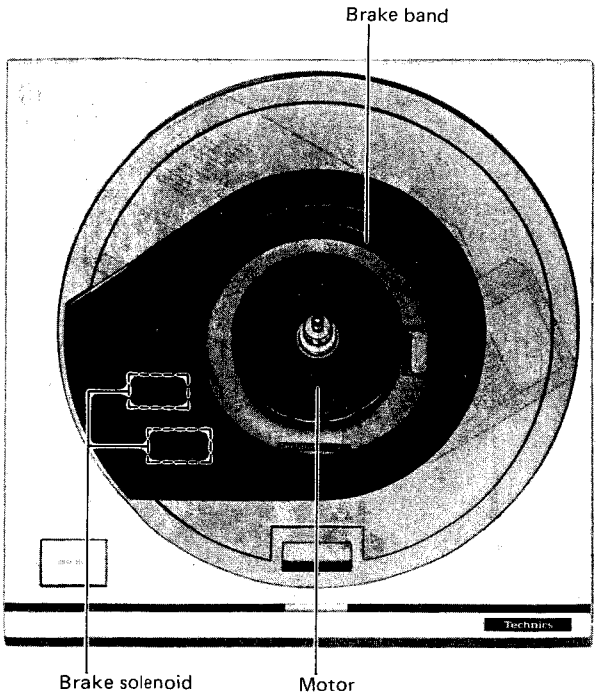
■ Plattenspieler

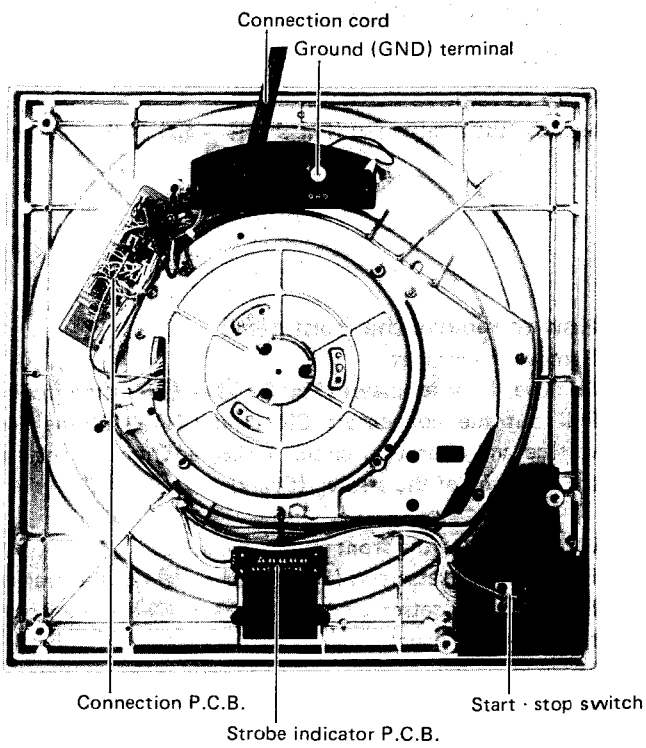
Typ:	Direktantriebs-Plattenspieler mit Quarz-Synthesizer-Drehzahlregelung
Plattenteller:	Kupferlegierung und Aluminium-Spritzguß; Durchmesser 32 cm, Gewicht 10 kg
Trägheitsmoment:	1,1 Tonnen·cm^2
Motor:	Quarzphasen-gesteuerter, ultralangsamer kollektorloser Gleichstrommotor
Plattenteller-Drehzahlen:	33-1/3 45 und U/min 78,26 U/min
Drehzahl-Feinregulierung:	Quarzgesteuert, Drehzahl regelbar in Stufen von 0,1% bis zu ±9,9%
Anlaufdrehmoment:	16 kg·cm
Hochlaufzeit:	0,25s (33-1/3 U/min)
Bremszeit:	0,3s (33-1/3 U/min)
Drehzahlschwankungen aufgrund von Lastdrehmoment:	0% innerhalb 10 kg·cm
Drehzahlabweichung:	Innerhalb ±0,001%
Gleichlaufschwankungen:	0,015% WRMS (JIS C5521) ±0,021% bewertet Null-zu-Spitze (DIN 45 500, IEC 98A bewertet) (getestetes System: SP-10MK3 + SH-10B5 + EPA-250 + EPC-100CMK3)
Rumpel-Fremdspannungsabstand:	–92 dB DIN B (IEC 98A bewertet)
Rumpel-Geräuschspannungsabstand:	–60 dB DIN A (IEC 98A unbewertet)

Gegenstand	Vorbereitungen	Zu justierende Teile	Justiermethode
VS-Spannung	1. Das Gleichstrom-Voltmeter an CN206 Anschluß ③ (+) und CN206 Anschluß ① (–) anschließen. 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen.	VR201	1. VR201 so justieren, daß die Ausgangsspannung 2,1V beträgt.
RS-Strom	1. Das Gelichstrom-Voltmeter an CN206 Anschluß ⑤ (+) und CN206 Anschluß ④ (–) anschließen. 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen. 3. Die Start-Taste drücken.	VR206	1. VR206 so justieren, daß die Ausgangsspannung 0V beträgt.
Synchronisierungs-Position	1. Das Oszilloskop an CN206 Anschluß ② (+) und CN206 Anschluß ① (–) anschließen. 2. Den Netzschalter einschalten und die Start-Taste drücken.	VR203 (33 U/min.) VR204 (45 U/min.) VR205 (78 U/min.)	1. Den Drehzahl-Wahlschalter nacheinander auf "33", "45" und "78" umschalten und VR203, VR204 und VR205 so justieren, da die Zeiten gemäß nachstehender Tabelle sind. Drehzahl / T: 33 / 8,5msec; 45 / 6,6msec; 78 / 3,8msec 
Bremse (elektrisch)	1. Den Anschluß CN202 herausziehen. (Bei gelöster mechanischer Bremse) 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen. 3. Die Start-Taste drücken.	VR202	1. Die Stoptaste drücken. 2. VR202 so justieren, daß der Bereich des Winkels für den Stopp der Drehung 90° ~ 180° beträgt.
Offset-Spannung	1. 40mV zwischen CN203 Anschlüsse ② und ③ mit der Gleichspannungsversorgung anlegen. 2. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ③ und ④ anschließen. 3. Den Netzschalter einschalten und die Start-Taste drücken.	VR101	1. VR101 so justieren, daß die Ausgangsspannung 10mV beträgt.
Mittelspannung	1. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ① und ② anschließen. 2. Den Netzschalter einschalten und die Start-Taste drücken.	VR102	1. VR102 so justieren, daß die Ausgangsspannung 0V beträgt.

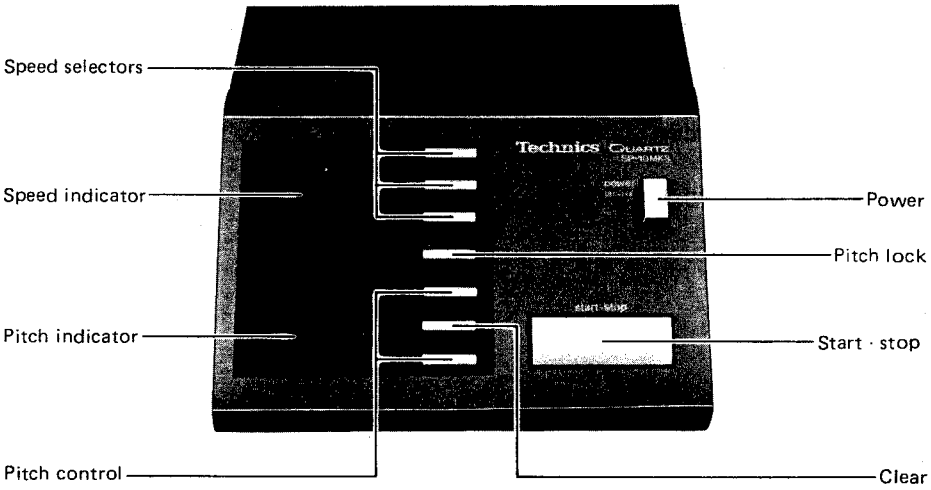
■ EXPLODED VIEW

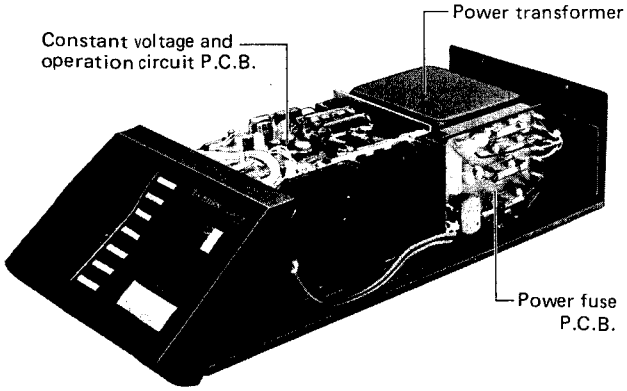


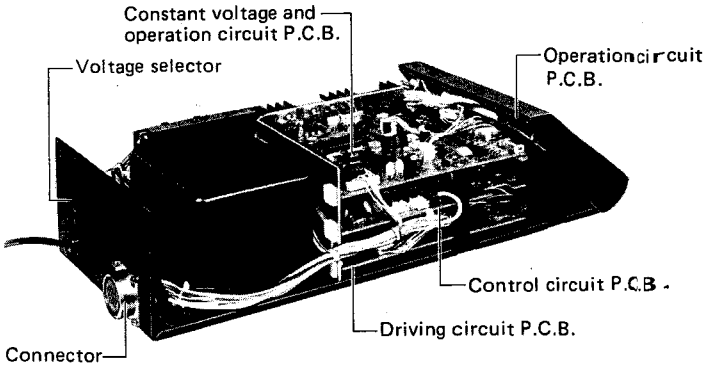




- **Control unit**







■ DISASSEMBLY INSTRUCTIONS

1. Control unit

• How to remove the cabinet

1. Remove the 8 setscrews (Fig. 1 : ❶ ~ ❽) of the cabinet.

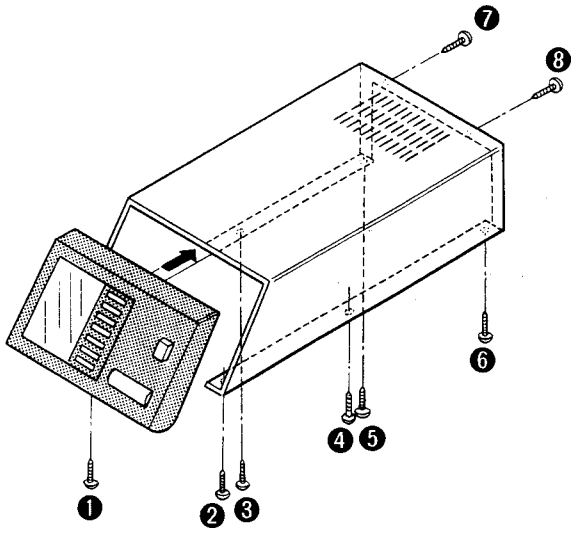


Fig. 1

• How to remove the front panel

1. Remove the cabinet.
2. Remove the 4 setscrews (Fig. 2 : ❾ ~ ⓬) of the front panel.
3. Pull out the connectors CN2 and CN403 of the constant voltage and operation circuit P.C.B. and remove the panel in the direction of the arrow. (Fig. 2)

* **When removing the front panel . . . . . .**

1. Remove the 4 setscrews (Fig. 3 : ⓭ ~ ⓰) of the bracket.
2. Remove the 4 setscrews (Fig. 4 : ⓱ ~ ⓴) of the front panel to remove the panel.

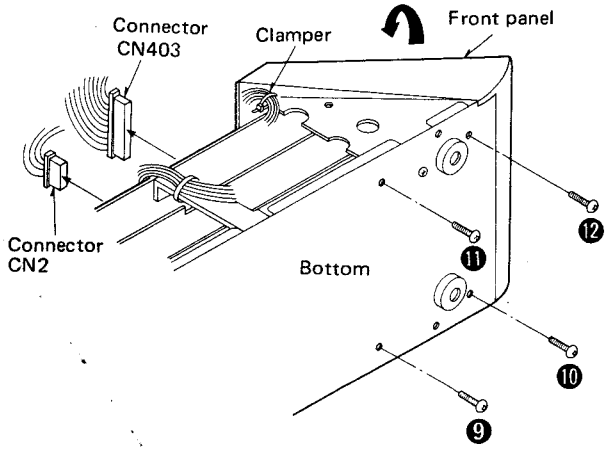


Fig. 2

• How to remove the operation circuit P.C.B.

1. Remove the cabinet and front penal.
2. Remove the bracket.
3. Remove the 3 setscrews (Fig. 3 : ㉑ ~ ㉓) of the printed circuit board.
4. Loosen 2 claws upward to remove then from the printed board. (Fig. 3)
5. Remove the printed circuit board in the direction of the arrow Ⓐ. (Fig. 3)

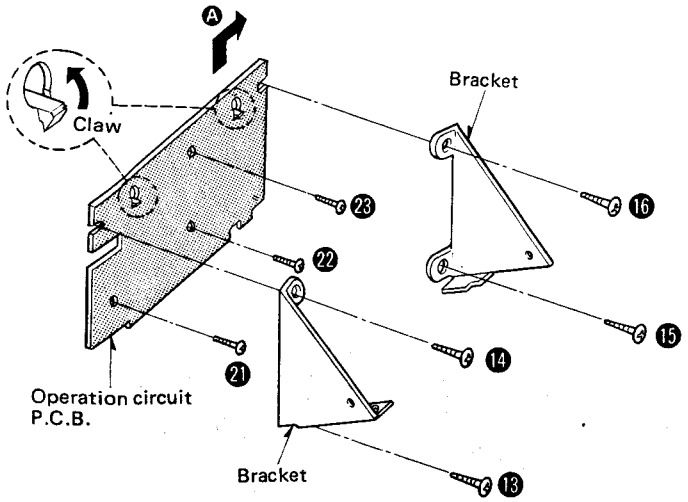
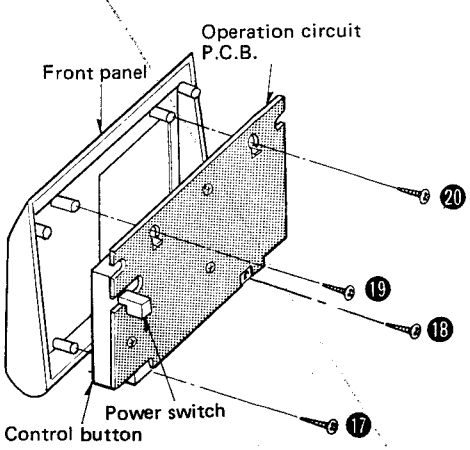


Fig. 3



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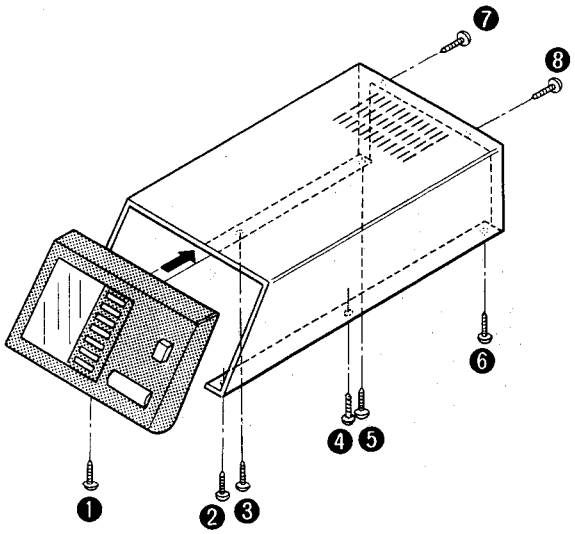

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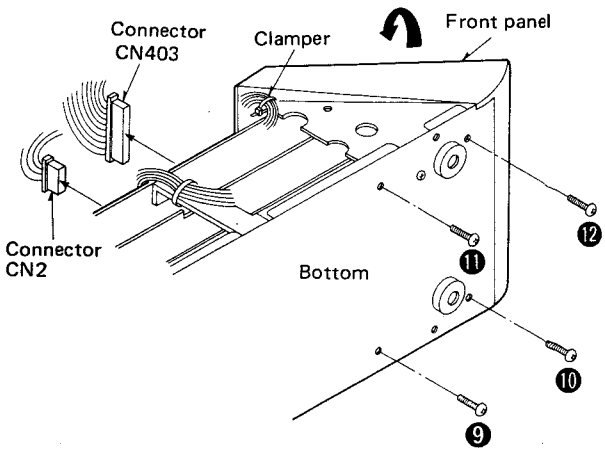

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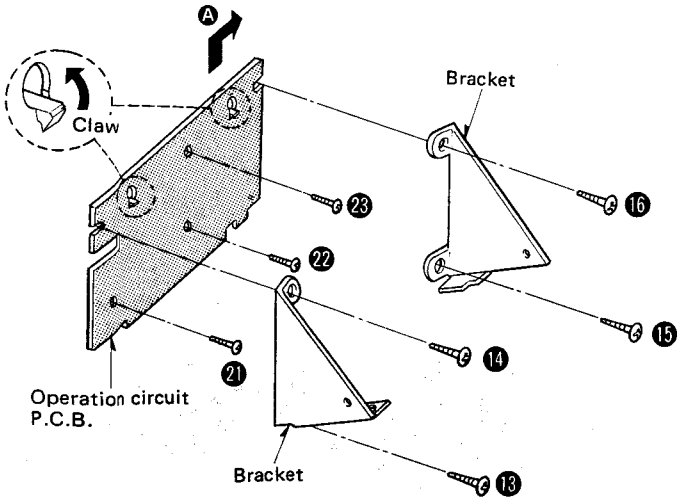

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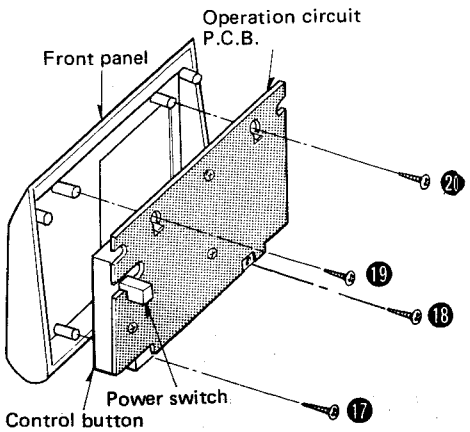
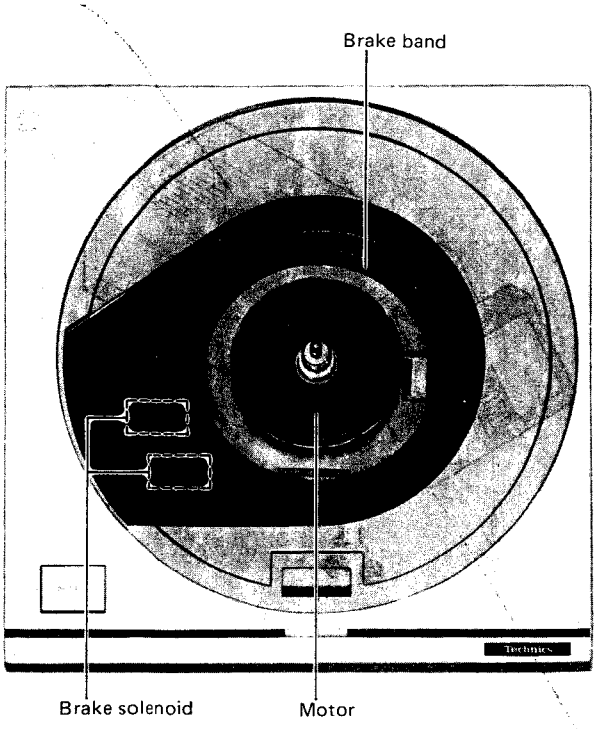
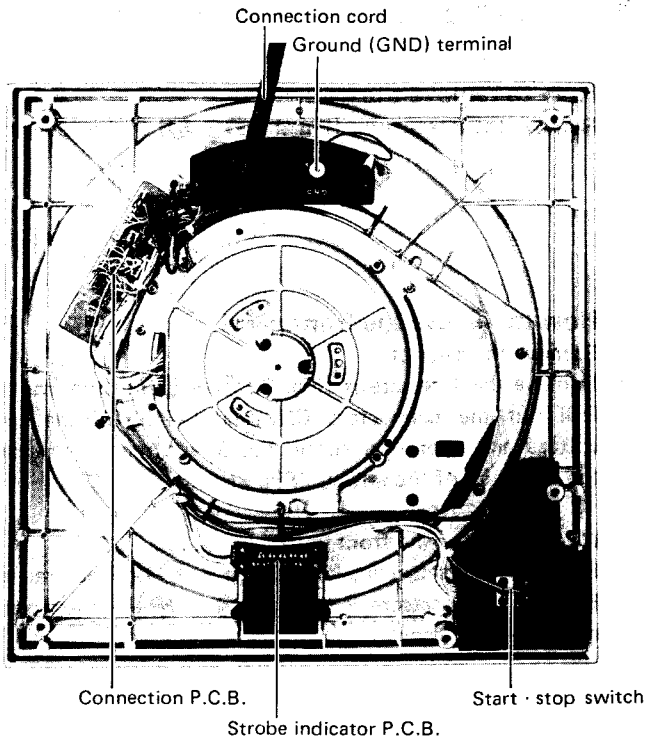


Fig. 4





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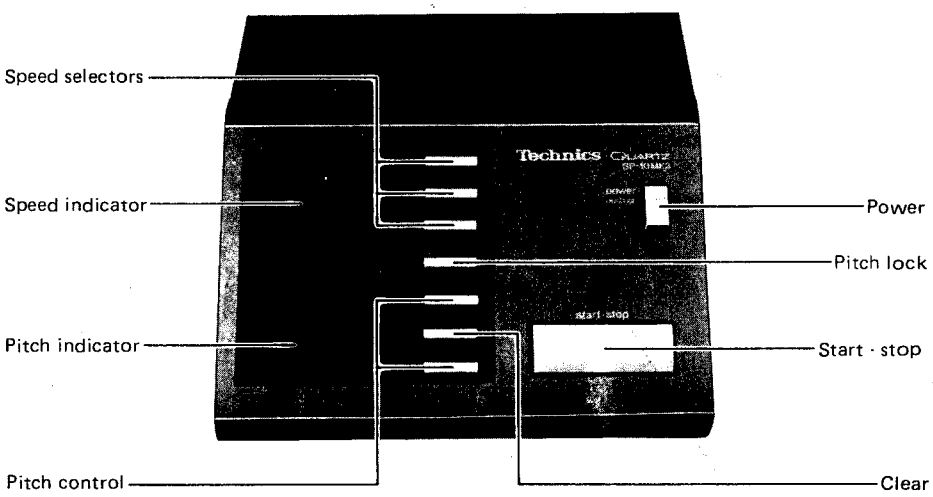
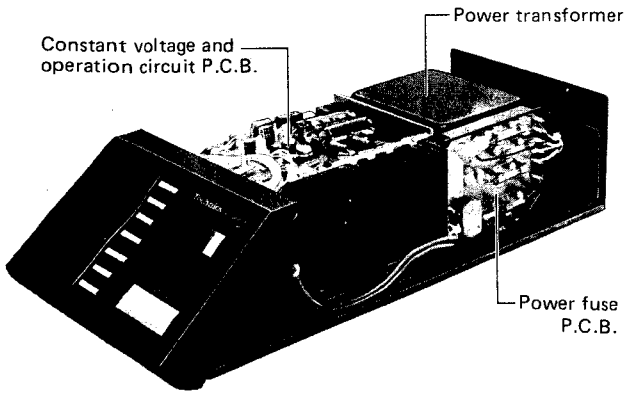
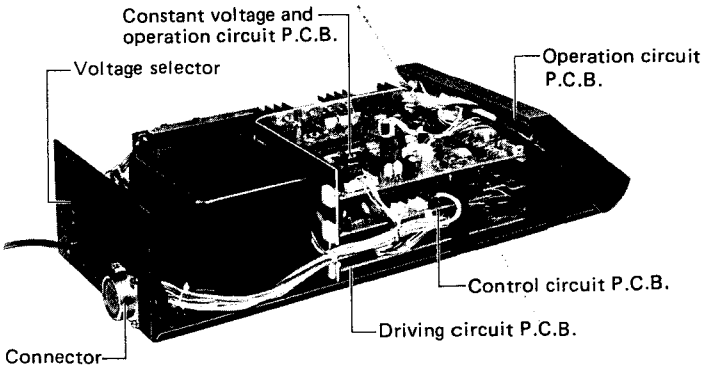






- **How to remove the control buttons (Start/stop, speed selector/pitch control) and the power switch.**

1. Remove the cabinet and front panel.
2. Remove the operation circuit P.C.B.
3. Remove the setscrews ㉔ and ㉕ in **Fig. 5** to remove the power switch.
4. Remove the setscrews ㉖ ~ ㉘ in **Fig. 5** to remove the speed selector/pitch control button.
5. Remove the setscrews ㉙ in **Fig. 5** to remove the start/stop button.

Note: The setscrews of the start/stop button and the speed selector/pitch control button are adjusted so that the screw tips slightly touch the buttons (to attain smooth switching). If further adjustment is needed, refer to Fig. 5 (A) and (B).

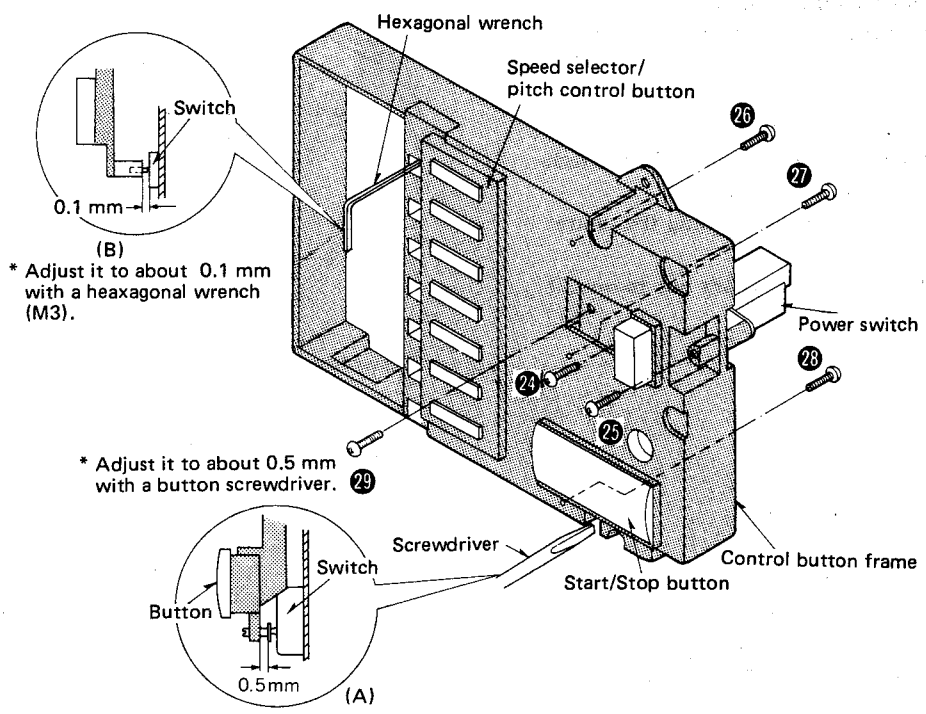


Fig. 5

- **How to remove the constant voltage and operation circuit P.C.B.**

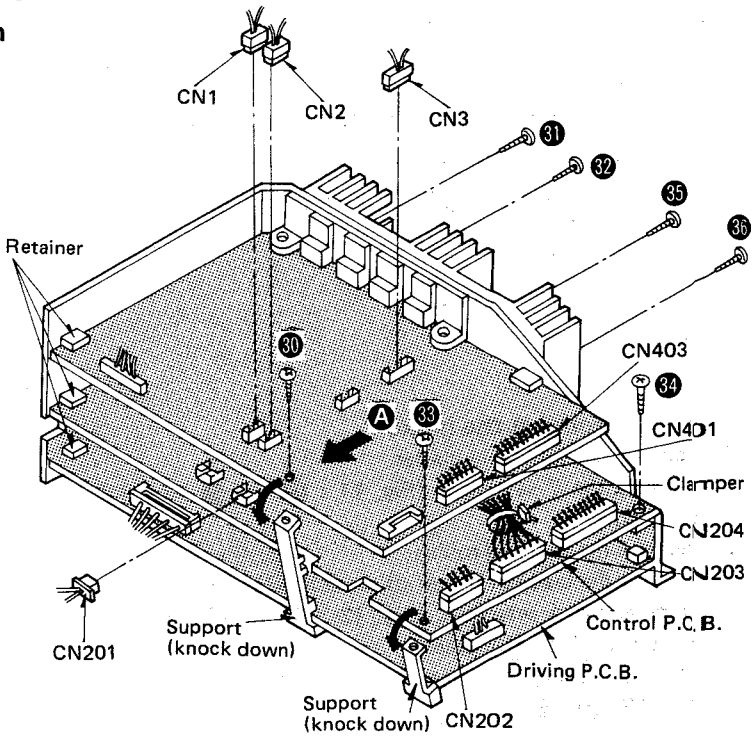
1. Remove the cabinet and front panel.
2. Pull out 4 connectors (CN2, CN3 CN202 and CN403). **(Fig. 6)**
3. Remove the 3 setscrews **(Fig. 6 : ㉚ ~ ㉜)** of the printed circuit board and remove the board in the direction of the arrow Ⓐ.

- **How to remove the control circuit P.C.B.**

1. Remove the cabinet and front panel.
2. Pull out 6 connectors (CN1, CN2 CN3, CN401, CN202 and CN204). **(Fig. 6)**
3. Remove the 3 setscrews **(Fig. 6 : ㉚, ㉝, ㉞)** of the printed board and remove the board in the direction of the arrow Ⓐ.

- **How to remove the driving circuit P.C.B.**

1. Remove the cabinet and front panel.
2. Pull out 5 connectors (CN1, CN2, CN401, CN202 and CN201). **(Fig. 6)**
3. Cut off the lead wire clamper of CN203.
4. Remove the 4 setscrews **(Fig. 6 : ㉚, ㉝, ㉟, ㊱)** of the printed board and remove the board in the direction of the arrow Ⓐ.



*** To mount each P.C.B., fit it in the P.C.B. retainer and support rod groove.**

Fig. 6

- **How to remove the power fuse P.C.B.**

1. Remove the cabinet.
2. Remove the 2 setscrews (**Fig. 7 : ㊲, ㊳**) of the printed circuit board.

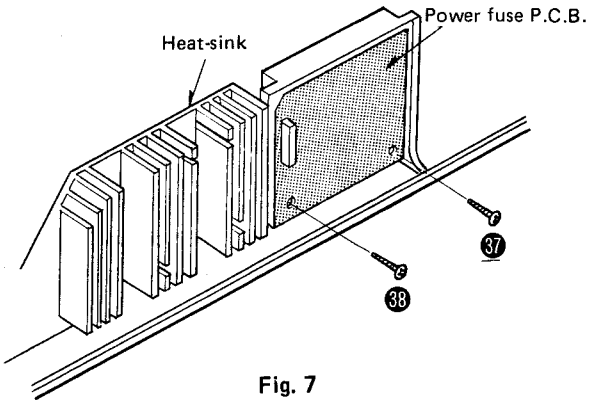


Fig. 7

2. Turntable unit

- **How to remove the turntable platter**

1. Turn off the power switch. (Check that the brake solenoid is "OFF".)
2. Turn the platter lock ring counterclockwise by using the wrench (attached) to remove the ring. **(Fig. 8)**
3. Completely fasten the platter mounting handle (cattached) into the screw holes (2 portions). (Fig. 8)
4. Slowly lift up the turntable platter, holding the platter mounting handle.

Note: The platter weighs 10 kg. Take care not to drop it when lifting.

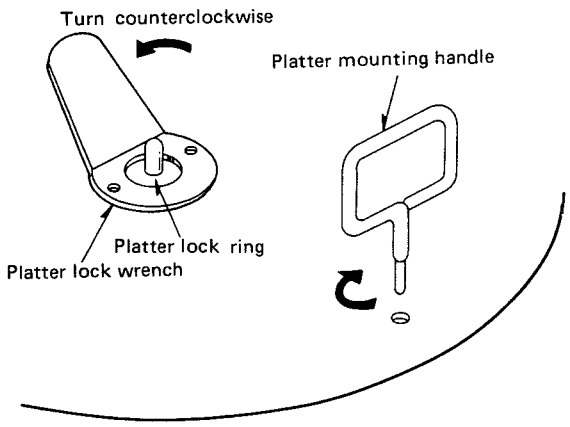


Fig. 8

- **How to remove the bottom cover**

1. Remove the turntable platter.
2. Place a proper base under the panel on either side so that external forces will not be applied to the center spindle. **(Fig. 9)**
3. Remove the 15 setscrews (**Fig. 10 : ㊴**) of the bottom cover.

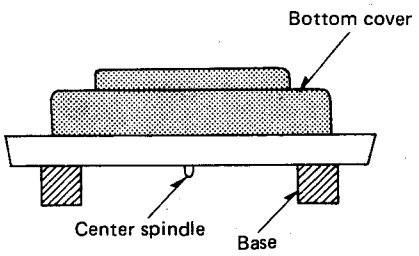


Fig. 9

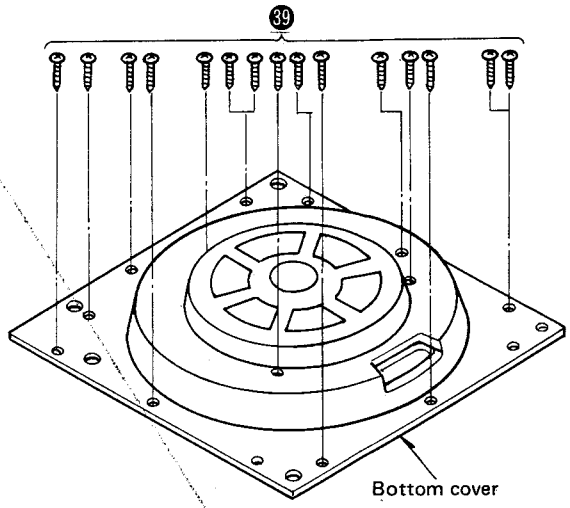


Fig. 10

- **How to remove the brake**

1. Remove the turntable platter.
2. Remove the 7 setscrews (**Fig. 11 : ㊵ ~ ㊻**) of the panel cover.
3. Remove the housing rubber.
4. Pull out the lead connector of the solenoid. **(Fig. 12)**
5. Remove the 4 setscrews (**Fig. 12 : ㊼ ~ ㊿**) of the brake and lift up the brake.
6. When removing the brake band, remove 2 setscrews (**Fig. 12 : ㊶, ㊷**).

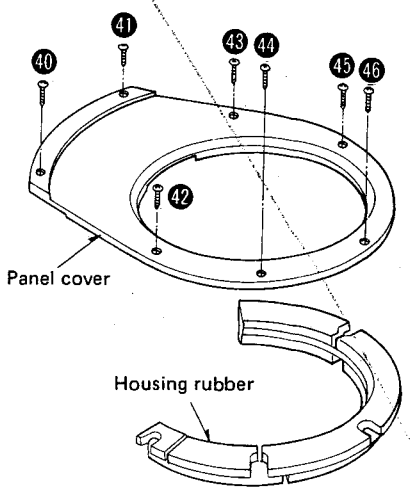


Fig. 11

• How to remove the power fuse P.C.B.

1. Remove the cabinet.
2. Remove the 2 setscrews (Fig. 7 : ㊲, ㊳) of the printed circuit board.

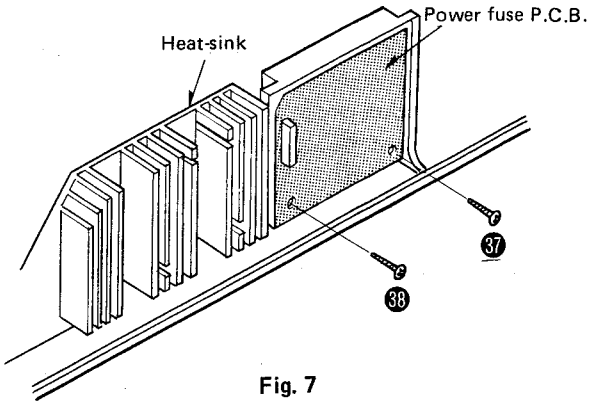


Fig. 7

2. Turntable unit

• How to remove the turntable platter

1. Turn off the power switch. (Check that the brake solenoid is "OFF".)
2. Turn the platter lock ring counterclockwise by using the wrench (attached) to remove the ring. (Fig. 8)
3. Completely fasten the platter mounting handle (cattached) into the screw holes (2 portions). (Fig. 8)
4. Slowly lift up the turntable platter, holding the platter mounting handle.

Note: The platter weighs 10 kg. Take care not to drop it when lifting.

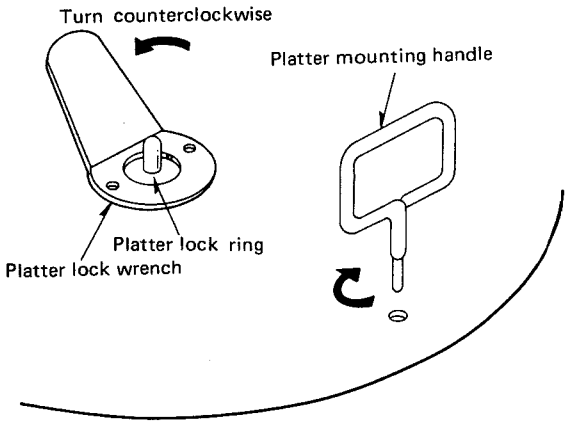


Fig. 8

• How to remove the bottom cover

1. Remove the turntable platter.
2. Place a proper base under the panel on either side so that external forces will not be applied to the center spindle. (Fig. 9)
3. Remove the 15 setscrews (Fig. 10 : ㊴) of the bottom cover.

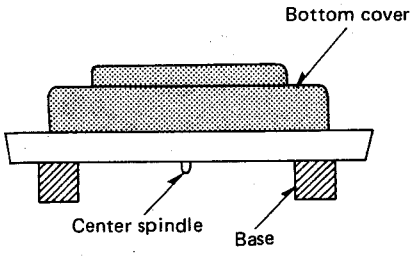


Fig. 9

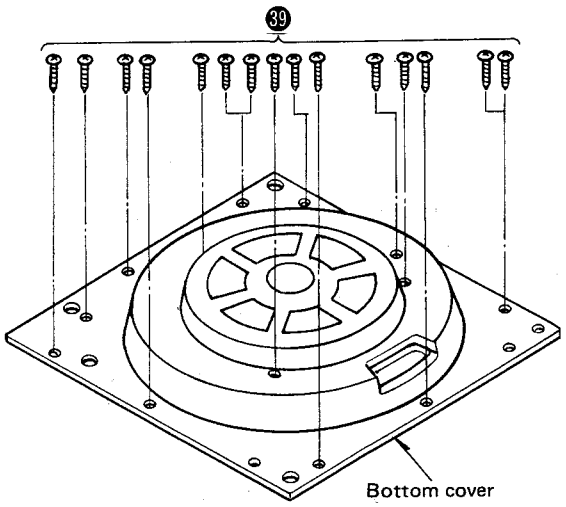


Fig. 10

• How to remove the brake

1. Remove the turntable platter.
2. Remove the 7 setscrews (Fig. 11 : ㊵ ~ ㊻) of the panel cover.
3. Remove the housing rubber.
4. Pull out the lead connector of the solenoid. (Fig. 12)
5. Remove the 4 setscrews (Fig. 12 : ㊼ ~ ㊿) of the brake and lift up the brake.
6. When removing the brake band, remove 2 setscrews (Fig. 12: ⑤①, ⑤②).

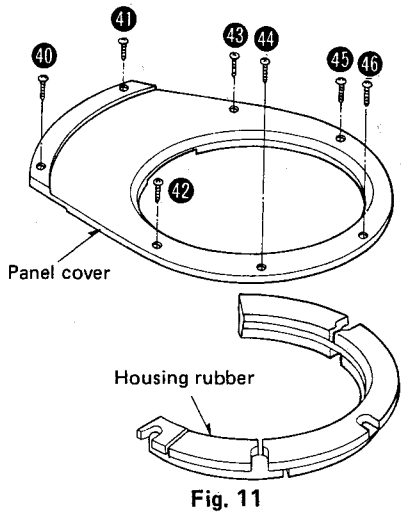


Fig. 11

- **How to remove the control buttons (Start/stop, speed selector/pitch control) and the power switch.**

1. Remove the cabinet and front panel.
2. Remove the operation circuit P.C.B.
3. Remove the setscrews ㉔ and ㉕ in **Fig. 5** to remove the power switch.
4. Remove the setscrews ㉖ ~ ㉘ in **Fig. 5** to remove the speed selector/pitch control button.
5. Remove the setscrews ㉙ in **Fig. 5** to remove the start/stop button.

Note: The setscrews of the start/stop button and the speed selector/pitch control button are adjusted so that the screw tips slightly touch the buttons (to attain smooth switching). If further adjustment is needed, refer to Fig. 5 (A) and (B).

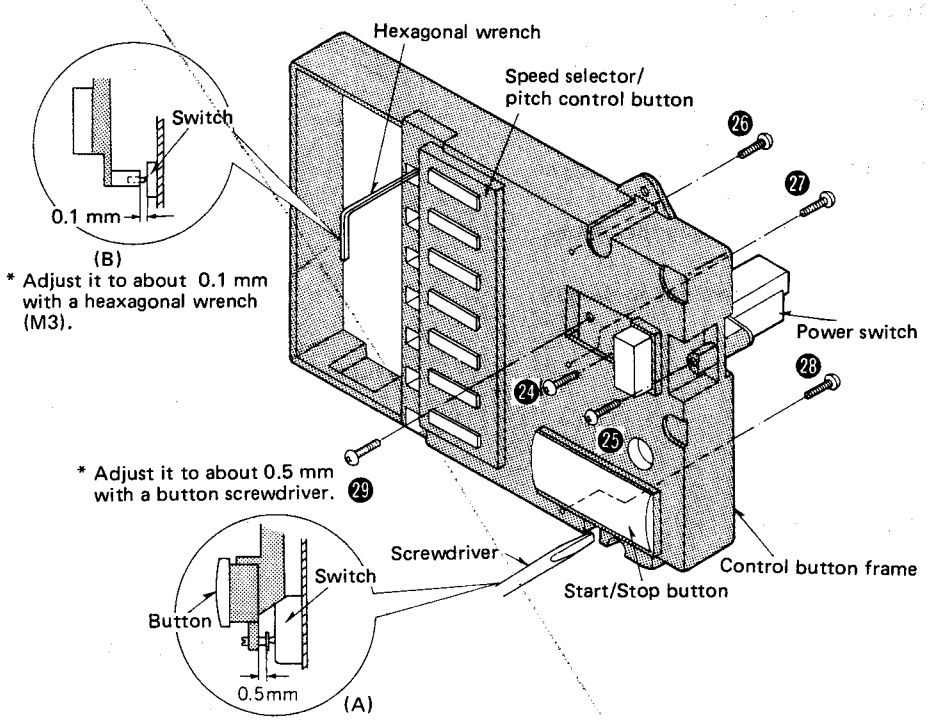


Fig. 5

- **How to remove the constant voltage and operation circuit P.C.B.**

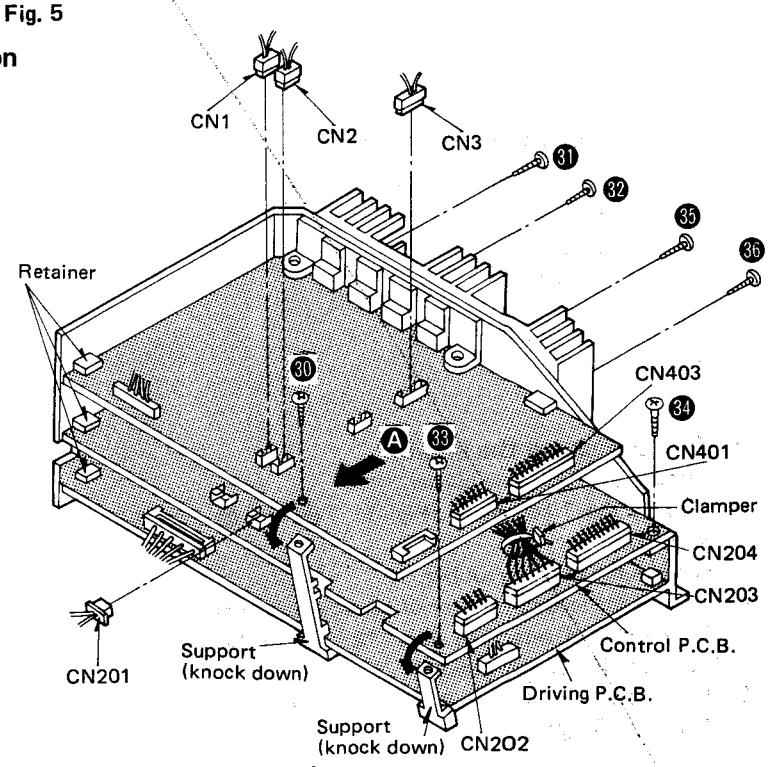
1. Remove the cabinet and front panel.
2. Pull out 4 connectors (CN2, CN3 CN202 and CN403). **(Fig. 6)**
3. Remove the 3 setscrews **(Fig. 6 : ㉚ ~ ㉜)** of the printed circuit board and remove the board in the direction of the arrow Ⓐ.

- **How to remove the control circuit P.C.B.**

1. Remove the cabinet and front panel.
2. Pull out 6 connectors (CN1, CN2 CN3, CN401, CN202 and CN204). **(Fig. 6)**
3. Remove the 3 setscrews **(Fig. 6 : ㉚, ㉝, ㉞)** of the printed board and remove the board in the direction of the arrow Ⓐ.

- **How to remove the driving circuit P.C.B.**

1. Remove the cabinet and front panel.
2. Pull out 5 connectors (CN1, CN2, CN401, CN202 and CN201). **(Fig. 6)**
3. Cut off the lead wire clamper of CN203.
4. Remove the 4 setscrews **(Fig. 6 : ㉚, ㉝, ㉟, ㊱)** of the printed board and remove the board in the direction of the arrow Ⓐ.



*** To mount each P.C.B., fit it in the P.C.B. retainer and support rod groove.**

Fig. 6

■ HOW TO CHECK THE PRINTED CIRCUIT BOARD

• Operation circuit P.C.B.

1. Remove the cabinet.
2. Remove the 4 setscrews (**Fig. 17 : ⑦① ~ ⑦④**) of the front panel.
3. Cut off the clamper, remove the front panel in the direction of the arrow and check the printed board from the back side.
4. When replacing the parts of the P.C.B., remove the P.C.B. **(Refer to "How to remove the operation circuit P.C.B.")**

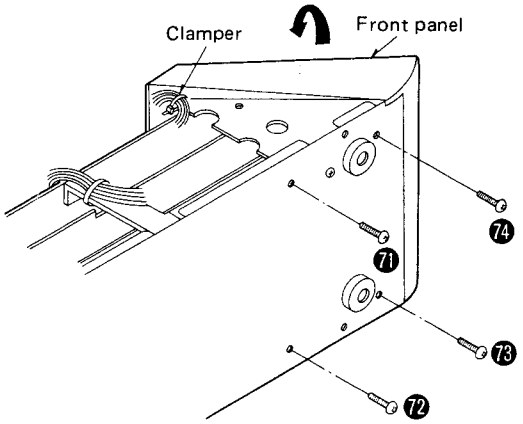


Fig. 17

• Constant voltage and operation circuit P.C.B.

1. Remove the cabinet and front panel.
2. Check from above the printed circuit board.
3. When replacing the parts of the printed circuit board, remove the P.C.B. **(Refer to "How to remove the constant voltage and operation circuit P.C.B.")**

Note: Do not check the conduction of the printed board with the heat-sink removed. (Keeping it energized for a long period of time may damage the parts.)

• Control circuit P.C.B.

1. Remove the cabinet and front panel.
2. Remove the printed circuit board. **(Refer to "How to remove the control circuit P.C.B.")**
3. Connect the connector and check the conduction.

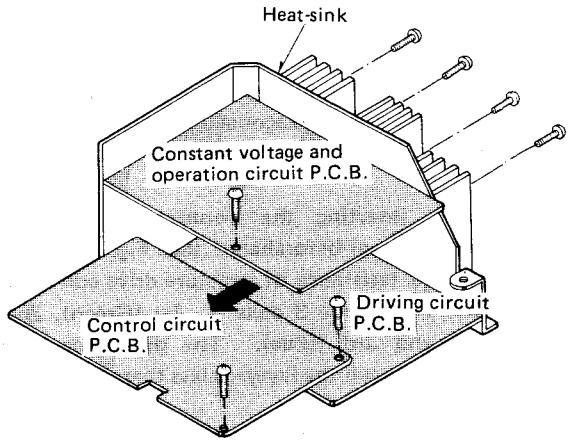


Fig. 18

• Driving circuit P.C.B.

1. Remove the cabinet and front panel.
2. Remove the 3 setscrews (**Fig. 19 : ⑦⑤ ~ ⑦⑦**) of the heat-sink and 2 setscrews (**Fig. 19 : ⑦⑧, ⑦⑨**) of the printed board support, shift down the board in the direciton of the arrow and check it from the back side. **(Fig. 20)**
3. When replacing the parts of the printed board, remove either the driving circuit P.C.B. **(Refer to "How to remove the driving circuit P.C.B.")**. or the control circuit P.C.B. **(Refer to "How to remove the control circuit P.C.B.")**

Note: Do not check the conduction of the driving circuit P.C.B. with the heat-sink removed. (If it is energized for a long period of time, the protection circuit will operate to stop the turntable. It may also damage the parts.)

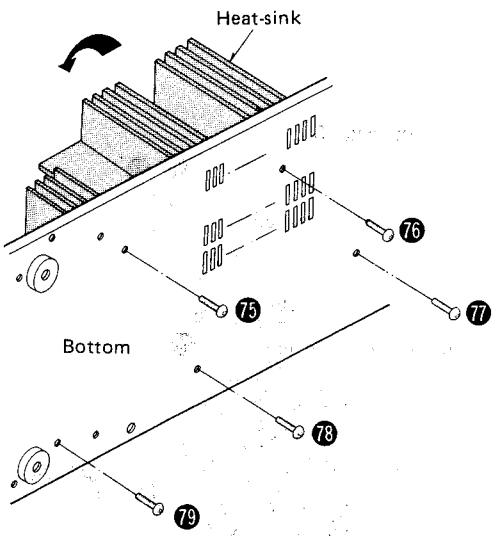


Fig. 19

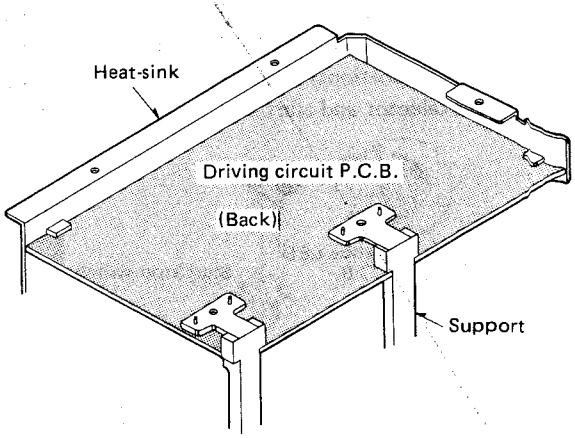


Fig. 20

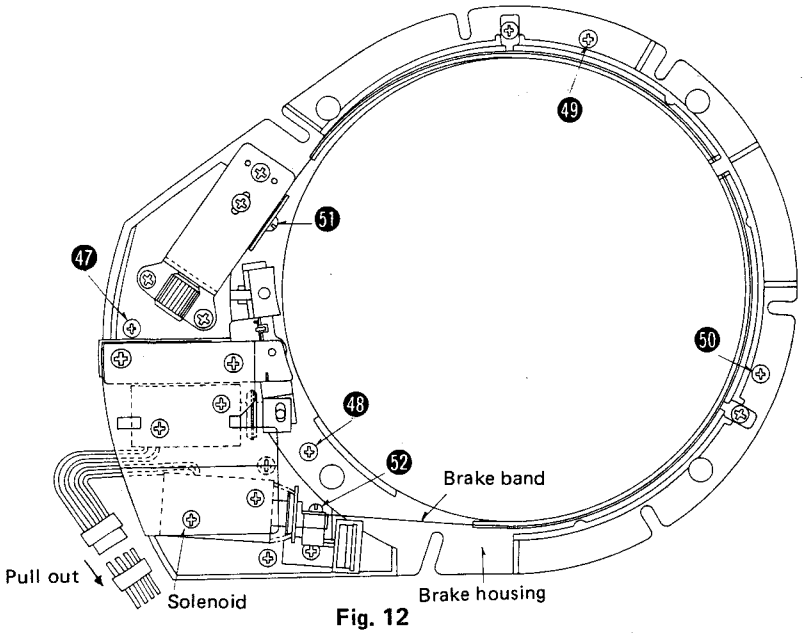


Fig. 12

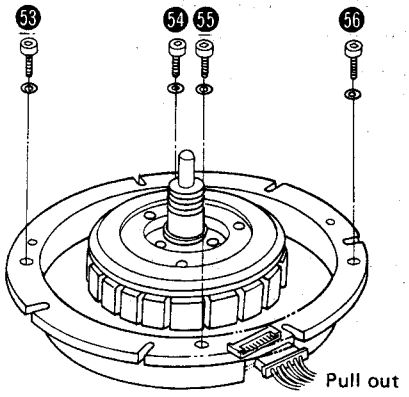


Fig. 13

• How to remove the motor

1. Remove the brake.
2. Remove the 4 setscrews (Fig. 13 : 53 ~ 56) of the stator frame. (Use the hexagonal wrench (M4)).
3. Pull out the connector and lift it up to remove the motor.

Notes: 1. When inserting the connector, remove the bottom cover beforehand. (See Fig. 14)

2. The DC resistance of armature drive coil is about 22Ω. (There are 3 coils — 1st (Green), 2nd (Red), and 3rd (Blue). The difference in resistance between the layers is less than 1Ω.)

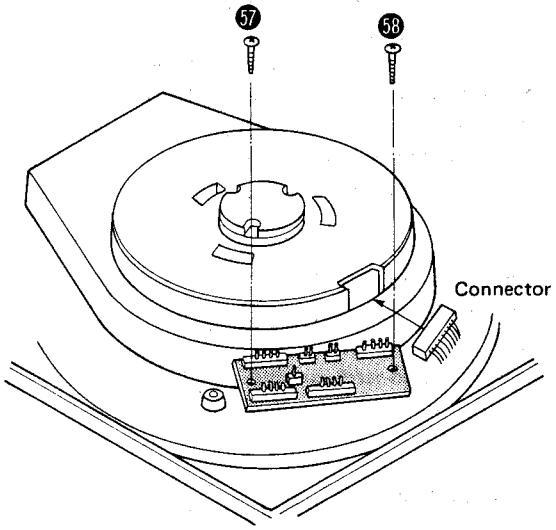


Fig. 14

• How to remove the connection P.C.B.

1. Remove the bottom cover.
2. Remove the 2 setscrews (Fig. 14 : 57 , 58) of the printed board to remove the board.

• How to remove the strobe LED P.C.B.

1. Remove the bottom cover.
2. Shift the claws which fasten the printed circuit board in the direction of the arrow to remove the board. (Fig. 15)

• How to remove the speed selector P.C.B.

1. Remove the bottom cover.
2. Remove the 5 setscrews (Fig. 15 : 59 ~ 63) of the speed selector P.C.B.
3. Remove the setscrews 64 , 65 in Fig. 15 to remove the start/stop switch.
4. Remove the 2 setscrews (Fig. 16 : 66 , 67) of the start/stop button.
5. Remove the 3 setscrews (Fig. 16 : 68 ~ 70) of the speed selector button.
6. Shift the claws (2 portions) in the direction of the arrow to remove the board.

* **For the speed selector and start/stop button screw adjustment refer to Fig. 5 on page 5.**

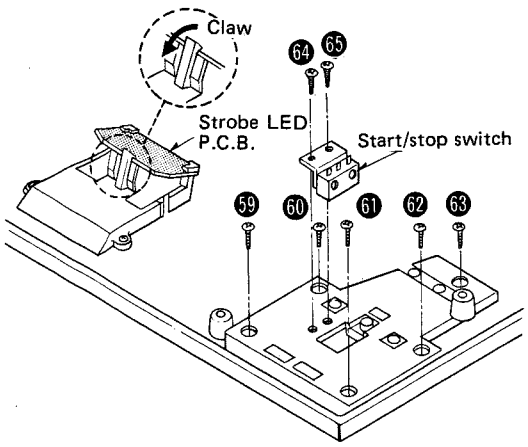


Fig. 15

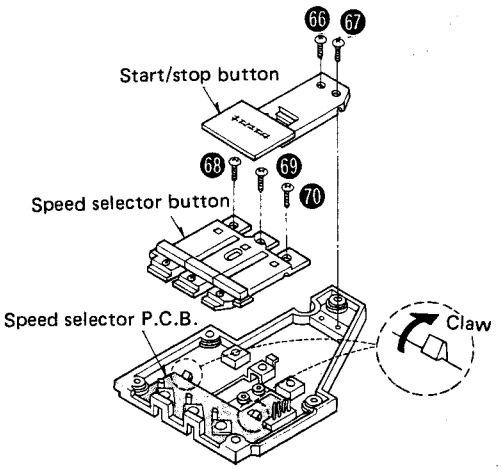


Fig. 16

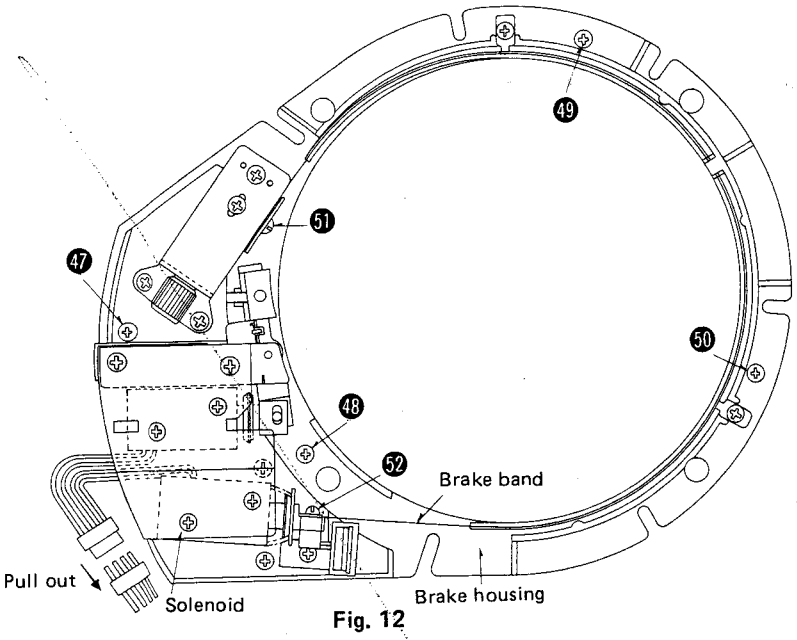


Fig. 12

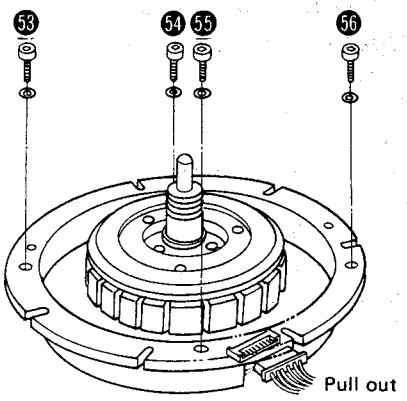


Fig. 13

• How to remove the motor

1. Remove the brake.
2. Remove the 4 setscrews (Fig. 13 : 53 ~ 56) of the stator frame. (Use the hexagonal wrench (M4)).
3. Pull out the connector and lift it up to remove the motor.

Notes: 1. When inserting the connector, remove the bottom cover beforehand. (See Fig. 14)

2. The DC resistance of armature drive coil is about 22Ω. (There are 3 coils — 1st (Green), 2nd (Red), and 3rd (Blue). The difference in resistance between the layers is less than 1Ω.)

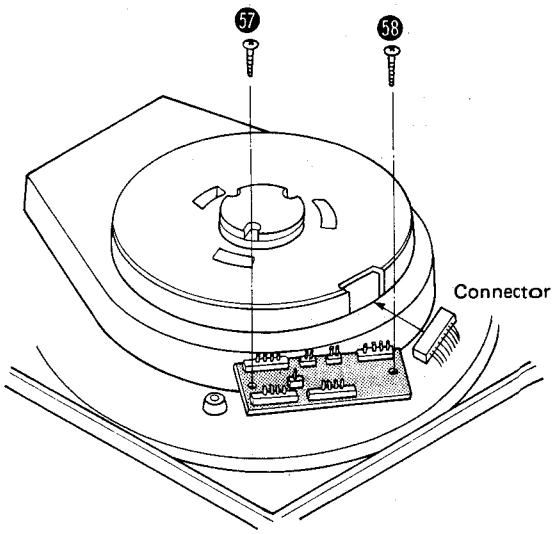


Fig. 14

• How to remove the connection P.C.B.

1. Remove the bottom cover.
2. Remove the 2 setscrews (Fig. 14 : 57 , 58) of the printed board to remove the board.

• How to remove the strobe LED P.C.B.

1. Remove the bottom cover.
2. Shift the claws which fasten the printed circuit board in the direction of the arrow to remove the board. (Fig. 15)

• How to remove the speed selector P.C.B.

1. Remove the bottom cover.
2. Remove the 5 setscrews (Fig. 15 : 59 ~ 63) of the speed selector P.C.B.
3. Remove the setscrews 64 , 65 in Fig. 15 to remove the start/stop switch.
4. Remove the 2 setscrews (Fig. 16 : 66 , 67) of the start/stop button.
5. Remove the 3 setscrews (Fig. 16 : 68 ~ 70) of the speed selector button.
6. Shift the claws (2 portions) in the direction of the arrow to remove the board.

* **For the speed selector and start/stop button screw adjustment refer to Fig. 5 on page 5.**

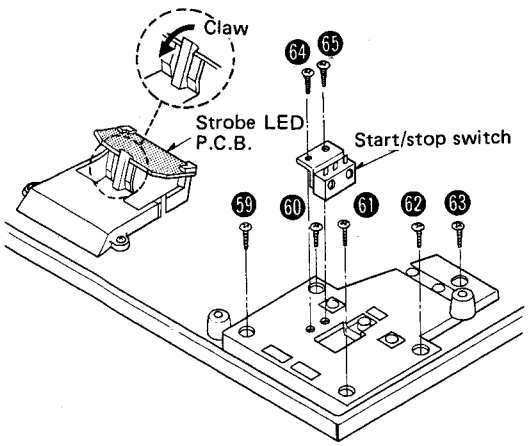


Fig. 15

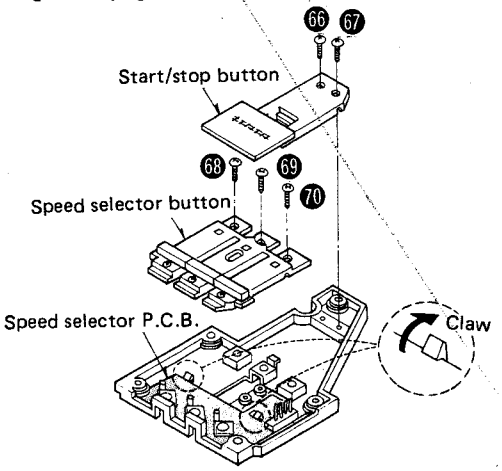


Fig. 16

■ HOW TO CHECK THE PRINTED CIRCUIT BOARD

• Operation circuit P.C.B.

1. Remove the cabinet.
2. Remove the 4 setscrews (Fig. 17 : ⑦① ~ ⑦④) of the front panel.
3. Cut off the clamper, remove the front panel in the direction of the arrow and check the printed board from the back side.
4. When replacing the parts of the P.C.B., remove the P.C.B. **(Refer to "How to remove the operation circuit P.C.B.")**

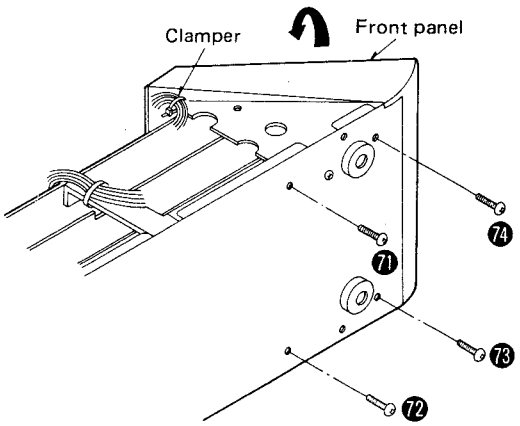


Fig. 17

• Constant voltage and operation circuit P.C.B.

1. Remove the cabinet and front panel.
2. Check from above the printed circuit board.
3. When replacing the parts of the printed circuit board, remove the P.C.B. **(Refer to "How to remove the constant voltage and operation circuit P.C.B.")**

Note: Do not check the conduction of the printed board with the heat-sink removed. (Keeping it energized for a long period of time may damage the parts.)

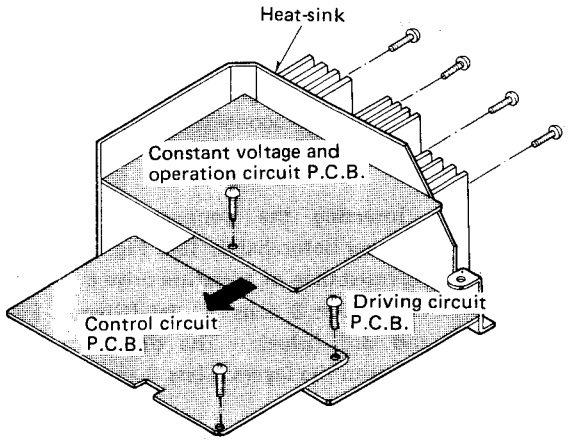


Fig. 18

• Control circuit P.C.B.

1. Remove the cabinet and front panel.
2. Remove the printed circuit board. **(Refer to "How to remove the control circuit P.C.B.")**
3. Connect the connector and check the conduction.

• Driving circuit P.C.B.

1. Remove the cabinet and front panel.
2. Remove the 3 setscrews (Fig. 19 : ⑦⑤ ~ ⑦⑦) of the heat-sink and 2 setscrews (Fig. 19 : ⑦⑧ , ⑦⑨) of the printed board support, shift down the board in the direciton of the arrow and check it from the back side. **(Fig. 20)**
3. When replacing the parts of the printed board, remove either the driving circuit P.C.B. **(Refer to "How to remove the driving circuit P.C.B.")**. or the control circuit P.C.B. **(Refer to "How to remove the control circuit P.C.B.")**

Note: Do not check the conduction of the driving circuit P.C.B. with the heat-sink removed. (If it is energized for a long period of time, the protection circuit will operate to stop the turntable. It may also damage the parts.)

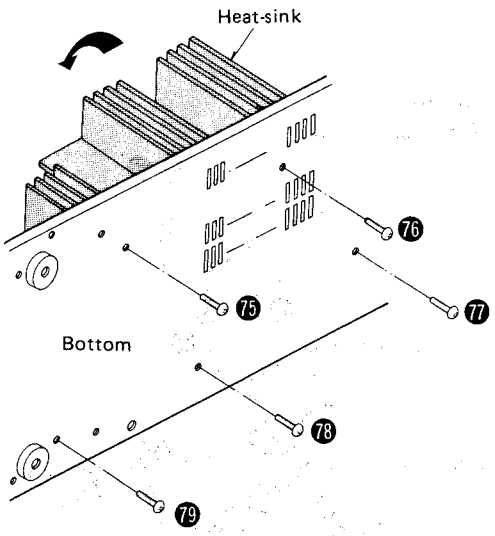


Fig. 19

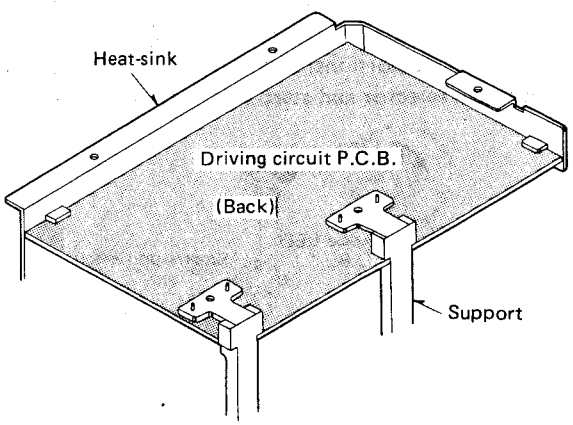
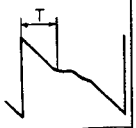


Fig. 20

■ MEASUREMENTS AND ADJUSTMENT

- **Instruments used and settings**

1. DC voltmeter
2. Oscilloscope
3. DC Power Supply.
4. Set the pitch control to 0%.

Item	Preparations	Adjusting Parts	Adjusting Method
Constant Voltage	1. Pull out the connectors CN1, CN2 and CN3. 2. Connect the DC voltmeter to either CN1 terminal ③ (+) and BT1 terminal ③ (−) or the negative side of C3. 3. Turn the power switch "on".	VR1	1. Adjust VR1 so that the output voltage is 31.8V.
	1. Pull out the connectors CN1, CN2 and CN3. 2. Connect the DC voltmeter to either CN1 terminal ① (+) and BT1 terminal ③ (−) or the negative side of C3. 3. Turn the power switch "on".	VR2	1. Adjust VR2 so that the output voltage is −31.8V.
Crystal Oscillation	1. Connect the oscilloscope to IC202 pin 7 and ground terminal. 2. Turn the power switch "on".	C211	1. Adjust C211 so that the cycle is 3.81 μsec. (262.08 kHz).
VS Voltage	1. Connect the DC voltmeter to CN206 terminal ③ (+) and CN206 terminal ① (−). 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.".	VR201	1. Adjust VR201 so that the output voltage is 2.1V.
RS Current	1. Connect the DC voltmeter to CN206 terminal ⑤ (+) and CN206 terminal ④ (−). 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.". 3. Press the start button.	VR206	1. Adjust VR206 so that the output voltage is 0V.
Synchronizing position	1. Connect the oscilloscope to CN206 terminal ② (+) and CN206 terminal ① (−). 2. Turn the power switch "on" and press the start button.	VR203 (33 r.p.m.) VR204 (45 r.p.m.) VR205 (78 r.p.m.)	1. Switch over the speed selector to "33", "45" and "78" and adjust VR203, VR204 and VR205 so that the time T is as in the table below: Speed / T 33 / 8.5msec. 45 / 6.6msec. 78 / 3.8msec. 
Brake (electric)	1. Pull out CN202 connector. (With mechanical brake released) 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.". 3. Press the start button.	VR202	1. Press the stop button. 2. Adjust VR202 so that the range of angle for stop of the rotation is 90° ~ 180°.
Offset voltage	1. Apply 40mV between CN203 terminals ② and ③ by the DC power supply. 2. Connect the DC voltmeter between CN102 terminals ③ and ④. 3. Turn the power switch "on" and press the start button.	VR101	1. Adjust VR101 so that the output voltage is 10mV.
Middle voltage	1. Connect the DC voltmeter between CN102 terminals ① and ②. 2. Turn the power switch "on" and press the start button.	VR102	1. Adjust VR102 so that the output voltage is 0V.

* Adjusting method without DC power supply for offset voltage adjustment

1. Solder 3 resistors to the driving circuit P.C.B. **(Refer to Fig. 21)**
2. Pull out CN203 connector. (Control circuit P.C.B.)
3. Connect CN203 terminal ⑤ to BT102 terminal ⑤ and CN203 terminal ④ to BT102 terminal ④, using lead wire with clip, etc.
4. Connect the DC voltmeter between CN102 terminals ③ and ④.
5. Turn the power switch "on" and press the start button.
6. Adjust VR101 so that the DC voltmeter reading is 10mV.
7. Remove the 3 resistors and lead wire.

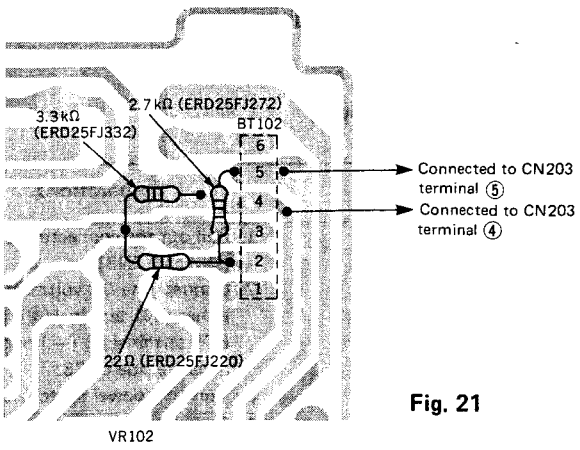


Fig. 21

• Adjustment of the mechanical brake

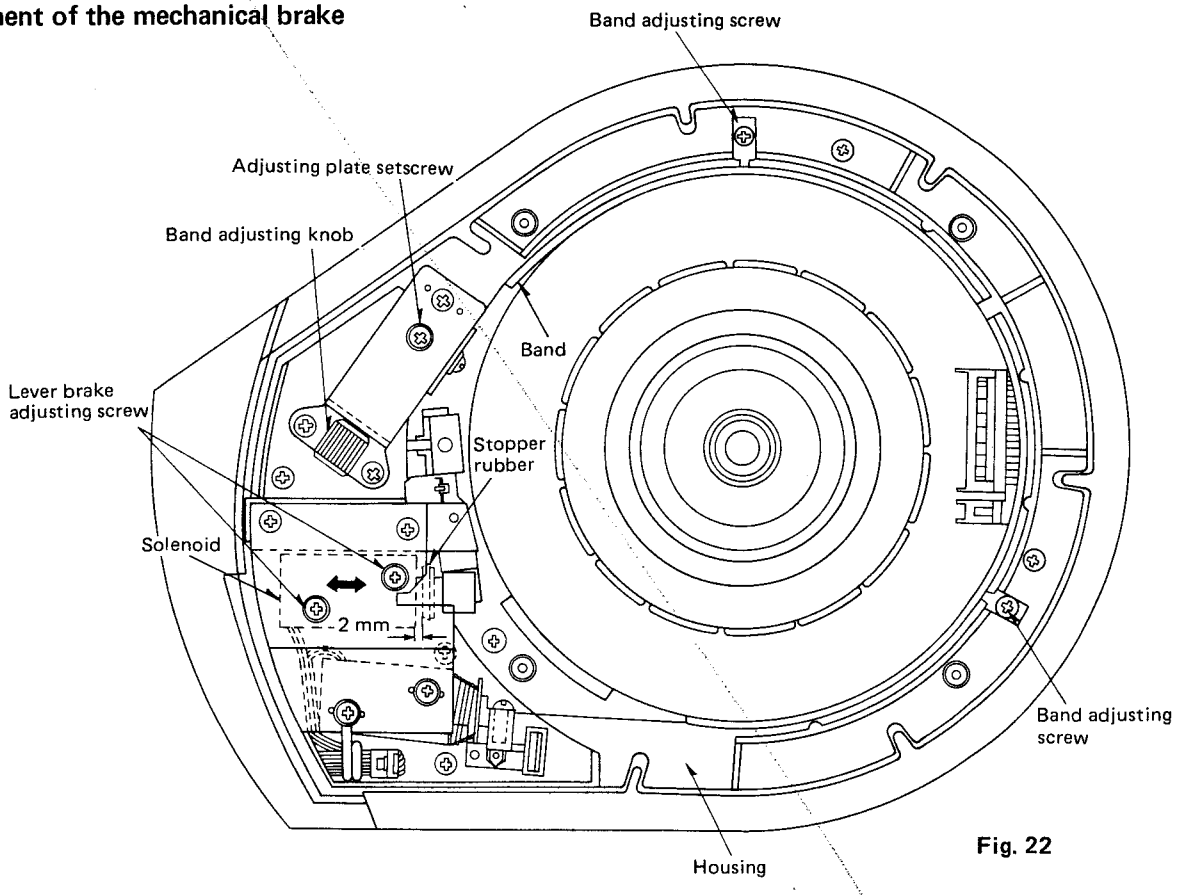


Fig. 22

1. Adjustment of the lever brake

1. Remove the turntable platter.
2. Loosen the lever brake adjusting screw.
3. Shift the solenoid right and left so that the clearance between the solenoid and stopper rubber is about 2 mm.
4. Tighten the lever brake adjusting screw.
5. Mount the turntable and check to see that the turntable does not move with the power switch set to "off".

2. Adjustment of the band brake

*** Check of the band position**

1. Remove the turntable.
2. The inner periphery of the band should match the inner periphery of the housing.
3. If they are deflected, adjust it by loosening the adjusting screws at two portions.

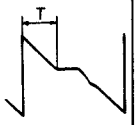
*** Check of the brake angle**

1. Turn the turntable.
2. Press the stop button and check to see that the range of angle for stop of the rotation is 40° or less.
3. If the stopping angle is over 40°, adjust the electric brake beforehand. **(Refer to page 9.)**
4. Next, loosen the adjusting plate setscrew and turn the adjusting knob so that the angle is 40° or less.

■ MEASUREMENTS AND ADJUSTMENT

- **Instruments used and settings**

1. DC voltmeter
2. Oscilloscope
3. DC Power Supply.
4. Set the pitch control to 0%.

Item	Preparations	Adjusting Parts	Adjusting Method
Constant Voltage	1. Pull out the connectors CN1, CN2 and CN3. 2. Connect the DC voltmeter to either CN1 terminal ③ (+) and BT1 terminal ③ (−) or the negative side of C3. 3. Turn the power switch "on".	VR1	1. Adjust VR1 so that the output voltage is 31.8V.
	1. Pull out the connectors CN1, CN2 and CN3. 2. Connect the DC voltmeter to either CN1 terminal ① (+) and BT1 terminal ③ (−) or the negative side of C3. 3. Turn the power switch "on".	VR2	1. Adjust VR2 so that the output voltage is −31.8V.
Crystal Oscillation	1. Connect the oscilloscope to IC202 pin 7 and ground terminal. 2. Turn the power switch "on".	C211	1. Adjust C211 so that the cycle is 3.81 μsec. (262.08 kHz).
VS Voltage	1. Connect the DC voltmeter to CN206 terminal ③ (+) and CN206 terminal ① (−). 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.".	VR201	1. Adjust VR201 so that the output voltage is 2.1V.
RS Current	1. Connect the DC voltmeter to CN206 terminal ⑤ (+) and CN206 terminal ④ (−). 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.". 3. Press the start button.	VR206	1. Adjust VR206 so that the output voltage is 0V.
Synchronizing position	1. Connect the oscilloscope to CN206 terminal ② (+) and CN206 terminal ① (−). 2. Turn the power switch "on" and press the start button.	VR203 (33 r.p.m.) VR204 (45 r.p.m.) VR205 (78 r.p.m.)	1. Switch over the speed selector to "33", "45" and "78" and adjust VR203, VR204 and VR205 so that the time T is as in the table below: Speed / T 33 / 8.5msec. 45 / 6.6msec. 78 / 3.8msec. 
Brake (electric)	1. Pull out CN202 connector. (With mechanical brake released) 2. Turn the power switch "on" and set the speed selector to "33 r.p.m.". 3. Press the start button.	VR202	1. Press the stop button. 2. Adjust VR202 so that the range of angle for stop of the rotation is 90° ~ 180°.
Offset voltage	1. Apply 40mV between CN203 terminals ② and ③ by the DC power supply. 2. Connect the DC voltmeter between CN102 terminals ③ and ④. 3. Turn the power switch "on" and press the start button.	VR101	1. Adjust VR101 so that the output voltage is 10mV.
Middle voltage	1. Connect the DC voltmeter between CN102 terminals ① and ②. 2. Turn the power switch "on" and press the start button.	VR102	1. Adjust VR102 so that the output voltage is 0V.

* Adjusting method without DC power supply for offset voltage adjustment

1. Solder 3 resistors to the driving circuit P.C.B. **(Refer to Fig. 21)**
2. Pull out CN203 connector. (Control circuit P.C.B.)
3. Connect CN203 terminal ⑤ to BT102 terminal ⑤ and CN203 terminal ④ to BT102 terminal ④, using lead wire with clip, etc.
4. Connect the DC voltmeter between CN102 terminals ③ and ④.
5. Turn the power switch "on" and press the start button.
6. Adjust VR101 so that the DC voltmeter reading is 10mV.
7. Remove the 3 resistors and lead wire.

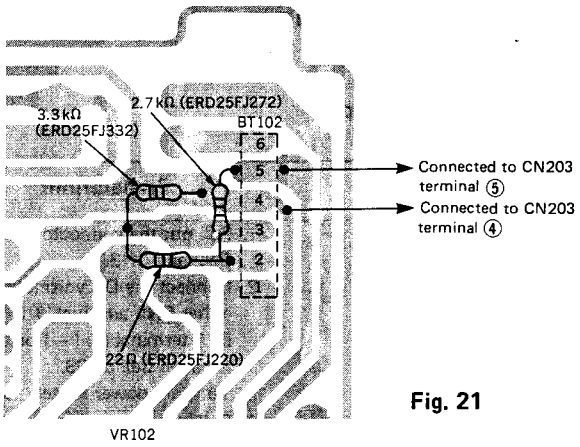


Fig. 21

• Adjustment of the mechanical brake

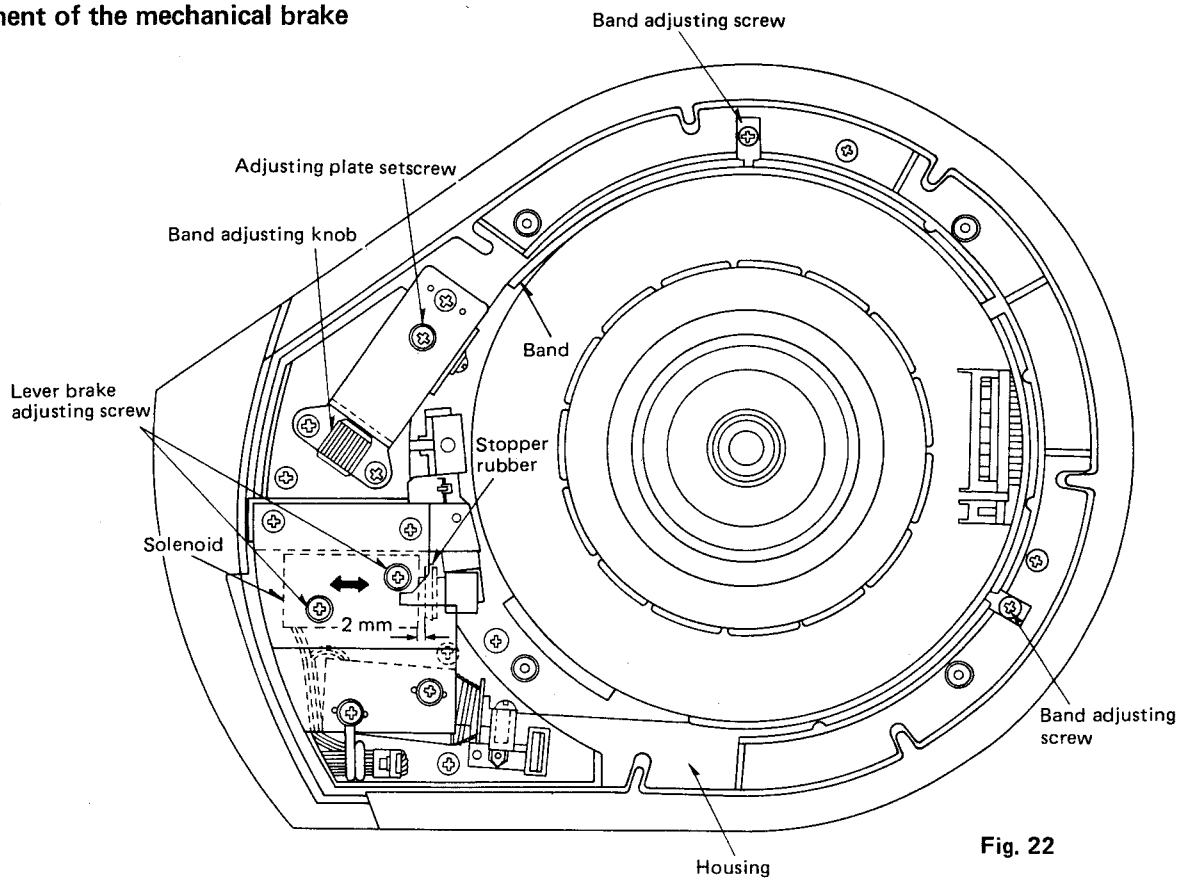


Fig. 22

1. Adjustment of the lever brake

1. Remove the turntable platter.
2. Loosen the lever brake adjusting screw.
3. Shift the solenoid right and left so that the clearance between the solenoid and stopper rubber is about 2 mm.
4. Tighten the lever brake adjusting screw.
5. Mount the turntable and check to see that the turntable does not move with the power switch set to "off".

2. Adjustment of the band brake

*** Check of the band position**

1. Remove the turntable.
2. The inner periphery of the band should match the inner periphery of the housing.
3. If they are deflected, adjust it by loosening the adjusting screws at two portions.

*** Check of the brake angle**

1. Turn the turntable.
2. Press the stop button and check to see that the range of angle for stop of the rotation is 40° or less.
3. If the stopping angle is over 40°, adjust the electric brake beforehand. **(Refer to page 9.)**
4. Next, loosen the adjusting plate setscrew and turn the adjusting knob so that the angle is 40° or less.

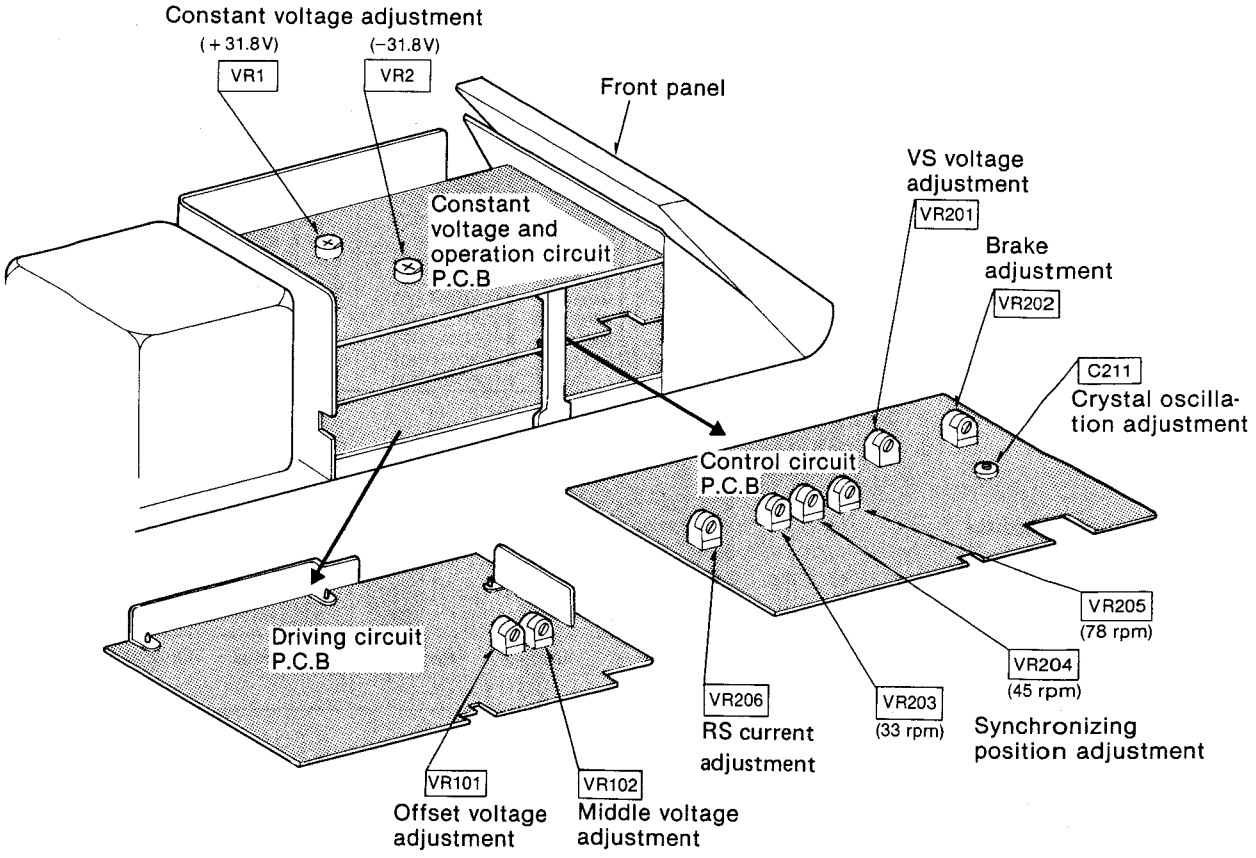
■ JUSTIERUNGEN

• Zu verwendende Instrumente und Einstellungen

1. Gleichstrom-Voltmeter
2. Oszilloskop
3. Gleichstromversorgung
4. Den Drehzahlregler auf 0% einstellen.

Gegenstand	Vorbereitungen	Zu justierende Teile	Justiermethode
Konstantspan-nungs-Stromver-sorgung	1. Die Anschlüsse CN1, CN2 und CN3 herausziehen. 2. Das Gleichstrom-Voltmeter entweder an den CN1-Anschluß ③ (+) und BT1-Anschluß ③ (–) oder die negative Seite von C3 anschließen. 3. Den Netzschalter einschalten.	VR1	1. VR1 auf einen Ausgang von 31,8V abgleichen.
	1. Die Anschlüsse CN1, CN2 und CN3 herausziehen. 2. Das Gleichstrom-Voltmeter entweder an den CN1-Anschluß ③ (+) und BT1-Anschluß ③ (–) oder die negative Seite von C3. 3. Den Netzschalter einschalten.	VR2	1. VR2 auf einen Ausgang von –31,8V abgleichen.
Kristalloszillation	1. Das Oszilloskop an IC202 Stift ⑦ und den Erdungsanschluß anschließen. 2. Den Netzschalter einschalten.	C211	1. C211 so justieren, daß der Zyklus 3,81 µsec (262,08kHz) beträgt.

• Adjustment points



1. 3 Widerstände an die Antriebsschaltungs-Platine anlöten. **(Siehe Abb. 21)**
2. Den CN203-Stecker herausziehen. (Steuerschaltungs-Platine).
3. CN203 Anschluß ⑤ an BT102 Anschluß ⑤, und CN203 Anschluß ④ and BT102 Anschluß ④ über Anschlußdrähte mit Klemmen anschließen.
4. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ③ und ④ anschließen.
5. Den Netzschalter einschalten und die Start-Taste drücken.
6. VR101 so justieren, daß das Gleichstrom-Voltmeter 10mV anzeigt.
7. Die 3 Widerstände und die Anschlußdrähte entfernen.

- **Justierung der mechanischen Bremse**

1. Justierung der Hebelbremse

1. Den Plattenteller abnehmen.
2. Die Hebelbremse-Justierschraube lösen.
3. Das Solenoid nach links und rechts bewegen, so daß ein Abstand von ca. 2mm zwischen dem Solenoid und dem Stoppergummi entsteht.

5. Den Plattenteller aufsetzen und überprüfen, daß der Plattenteller sich nicht bewegt, wenn der Netzschalter ausgeschaltet ist.

2. Justierung der Bandbremse

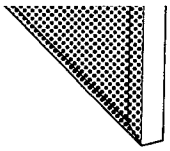
*** Überprüfung der Bandposition**

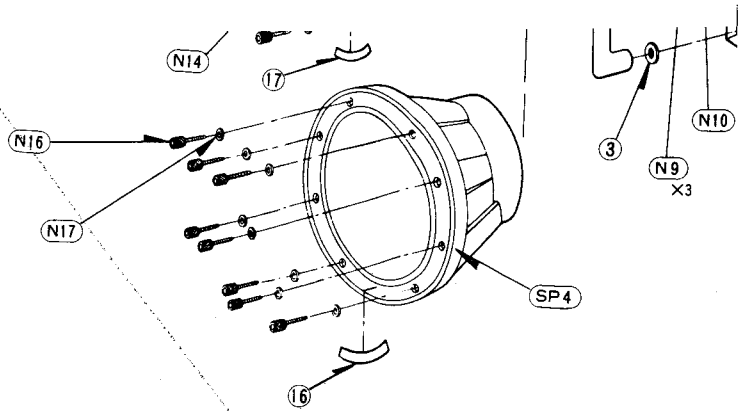
1. Den Plattenteller abnehmen.
2. Die innere Peripherie des Bandes sollte mit der inneren Peripherie des Gehäuses übereinstimmen.
3. Falls sie voneinander abweichen, durch Lösen der Justierschrauben an zwei Teilen justieren.

*** Überprüfung des Bremswinkels**

1. Den Plattenteller drehen.
2. Die Stoptaste drücken und überprüfen, daß der Bereich des Winkels zum Stoppen der Drehung 40° oder weniger beträgt.
3. Falls der Stoppwinkel über 40° beträgt, zuerst die elektrische Bremse justieren.
4. Anschließend die Justierungsplatten-Einstellschraube lösen und den Justierknopf so drehen, daß der Winkel 40° oder weniger wird.

2



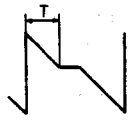


■ REPLACEMENT PARTS LIST

Notes: 1. Part numbers of indicated on most mechanical parts. Please use this part number of parts orders.
2. The "S" mark is service standard parts and may differ from production parts.
*This model has for Right and Left type.

Ref. No.		Part No.	Part Name & Description	
SPEAKERS				
SP1		SASS3PHMIT	Speaker, Tweeter	(1)
SP2		EAS12PM216S	Speaker, Mid-High	(1)
SP3		EAS22PL03S	Speaker, Mid-Low	(1)
SP4		EAS38PL32S	Speaker, Woofer	(1)
COILS				
L1		SLCD682JU	Coil, 6.8mH	(1)
L2		SLCSB222JU	Coil, 22.2mH	(1)
L3		SLCSB682JU	Coil, 6.8mH	(1)
L4		SLCSB331KU	Coil, 0.33mH	(1)
L5		SLCSB561KU	Coil, 0.56mH	(1)
L6		SLCSB102JU	Coil, 1.0mH	(1)
L7		SLCSC221KU	Coil, 0.22mH	(1)

Ref. No.		Part No.	Part Name & Description	
CAPACITORS				
C1		ECEA100Y56K	Electrolytic 100V 56μF	(1)
C2		ECQE1825JN	Polyester 100V 8.2μF	(1)
C3		ECEA100Y15K	Electrolytic 100V 15μF	(1)
C4		ECQE1565JN	Polyester 100V 5.6μF	(1)
C5~C9		ECQE1106JN	Polyester 100V 10μF	(1)
C10		ECQE1475JN	Polyester 100V 4.7μF	(1)
C11		ECQE1335JN	Polyester 100V 3.3μF	(1)
C12		ECQE1106JN	Polyester 100V 10μF	(1)
C13		ECQE1475JN	Polyester 100V 4.7μF	(1)
C14		ECQE1825JN	Polyester 100V 8.2μF	(1)
C15		ECQE1475JN	Polyester 100V 4.7μF	(1)
RESISTORS				
R1		ERF10ZXK8R2	Resistor, 10W 8.2Ω	(1)
R2		ERF10ZXK3R9	Resistor, 10W 3.9Ω	(1)
R3~5		ERF10ZXK3R3	Resistor, 10W 3.3Ω	(1)
BREAKER				
B1		SSBS10AB02-2	Thermal Relay, 1.0A	(1)

Gegenstand	Vorbereitungen	Zu justierende Teile	Justiermethode
VS-Spannung	1. Das Gleichstrom-Voltmeter an CN206 Anschluß ③ (+) und CN206 Anschluß ① (−) anschließen. 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen.	VR201	1. VR201 so justieren, daß die Ausgangsspannung 2,1V beträgt.
RS-Strom	1. Das Gelichstrom-Voltmeter an CN206 Anschluß ⑤ (+) und CN206 Anschluß ④ (−) anschließen. 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen. 3. Die Start-Taste drücken.	VR206	1. VR206 so justieren, daß die Ausgangsspannung 0V beträgt.
Synchronisierungs-Position	1. Das Oszilloskop an CN206 Anschluß ② (+) und CN206 Anschluß ① (−) anschließen. 2. Den Netzschalter einschalten und die Start-Taste drücken.	VR203 (33 U/min.) VR204 (45 U/min.) VR205 (78 U/min.)	1. Den Drehzahl-Wahlschalter nacheinander auf "33", "45" und "78" umschalten und VR203, VR204 und VR205 so justieren, da die Zeiten gemäß nachstehender Tabelle sind. Drehzahl / T: 33 / 8,5msec; 45 / 6,6msec; 78 / 3,8msec 
Bremse (elektrisch)	1. Den Anschluß CN202 herausziehen. (Bei gelöster mechanischer Bremse) 2. Den Netzschalter einschalten und den Drehzahl-Wahlschalter auf "33 U/min." einstellen. 3. Die Start-Taste drücken.	VR202	1. Die Stoptaste drücken. 2. VR202 so justieren, daß der Bereich des Winkels für den Stopp der Drehung 90° ~ 180° beträgt.
Offset-Spannung	1. 40mV zwischen CN203 Anschlüsse ② und ③ mit der Gleichspannungsversorgung anlegen. 2. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ③ und ④ anschließen. 3. Den Netzschalter einschalten und die Start-Taste drücken.	VR101	1. VR101 so justieren, daß die Ausgangsspannung 10mV beträgt.
Mittelspannung	1. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ① und ② anschließen. 2. Den Netzschalter einschalten und die Start-Taste drücken.	VR102	1. VR102 so justieren, daß die Ausgangsspannung 0V beträgt.

* Justiermethode ohne Gleichstromversorgung für die Offsetspannungs-Justierung

1. 3 Widerstände an die Antriebsschaltungs-Platine anlöten. **(Siehe Abb. 21)**
2. Den CN203-Stecker herausziehen. (Steuerschaltungs-Platine).
3. CN203 Anschluß ⑤ an BT102 Anschluß ⑤, und CN203 Anschluß ④ and BT102 Anschluß ④ über Anschlußdrähte mit Klemmen anschließen.
4. Das Gleichstrom-Voltmeter zwischen CN102 Anschlüsse ③ und ④ anschließen.
5. Den Netzschalter einschalten und die Start-Taste drücken.
6. VR101 so justieren, daß das Gleichstrom-Voltmeter 10mV anzeigt.
7. Die 3 Widerstände und die Anschlußdrähte entfernen.

• Justierung der mechanischen Bremse

1. Justierung der Hebelbremse

1. Den Plattenteller abnehmen.
2. Die Hebelbremse-Justierschraube lösen.
3. Das Solenoid nach links und rechts bewegen, so daß ein Abstand von ca. 2mm zwischen dem Solenoid und dem Stoppergummi entsteht.
4. Die Hebelbremse-Justierschraube anziehen.
5. Den Plattenteller aufsetzen und überprüfen, daß der Plattenteller sich nicht bewegt, wenn der Netzschalter ausgeschaltet ist.

2. Justierung der Bandbremse

*** Überprüfung der Bandposition**

1. Den Plattenteller abnehmen.
2. Die innere Peripherie des Bandes sollte mit der inneren Peripherie des Gehäuses übereinstimmen.
3. Falls sie voneinander abweichen, durch Lösen der Justierschrauben an zwei Teilen justieren.

*** Überprüfung des Bremswinkels**

1. Den Plattenteller drehen.
2. Die Stoptaste drücken und überprüfen, daß der Bereich des Winkels zum Stoppen der Drehung 40° oder weniger beträgt.
3. Falls der Stoppwinkel über 40° beträgt, zuerst die elektrische Bremse justieren.
4. Anschließend die Justierungsplatten-Einstellschraube lösen und den Justierknopf so drehen, daß der Winkel 40° oder weniger wird.

QUARTZ Direct Drive Turntable SP-10MK3

This booklet contains the specifications and adjusting procedures for SP-10MK3, written in Germany, French and Spanish.
File this manual together with the SP-10MK3 service manual (Order No. SD82062239C8).

DEUTSCH

■ TECHNISCHE DATEN

Änderungen der technischen Daten vorbehalten.
Die angegebenen Gewichts- und Abmessungsdaten sind ungefähre Werte.

■ Allgemeine Daten

Stromversorgung: ~ 110-120V/220-240V, 50/60Hz, Wechselstrom
Leistungsaufnahme: 32,5 W
Abmessungen (B x H x T): (Plattenspielereinheit) 11,3 x 36,9 x 36,9 cm (Steuereinheit) 9,6 x 16,6 x 41 cm
Gewicht: 18 kg (Plattenspielereinheit) 6 kg (Steuereinheit)

■ Plattenspieler

Typ: Direktantriebs-Plattenspieler mit Quarz-Synthesizer-Drehzahlregelung
Plattenteller: Kupferlegierung und Aluminium-Spritzguß; Durchmesser 32 cm, Gewicht 10 kg
Trägheitsmoment: 1,1 Tonnen-cm²
Motor: Quarzphasen-gesteuerter, ultralangsamer kollektorloser Gleichstrommotor
Plattenteller-Drehzahlen: 33-1/3 45 und U/min 78,26 U/min
Drehzahl-Feinregulierung: Quarzgesteuert, Drehzahl regelbar in Stufen von 0,1% bis zu ±9,9%
Anlaufdrehmoment: 16 kg·cm
Hochlaufzeit: 0,25s (33-1/3 U/min)
Bremszeit: 0,3s (33-1/3 U/min)
Drehzahlschwankungen aufgrund von Lastdrehmoment: 0% innerhalb 10 kg·cm
Drehzahlabweichung: Innerhalb ±0,001%
Gleichlaufschwankungen: 0,015% WRMS (JIS C5521) ±0,021% bewertet Null-zu-Spitze (DIN 45 500, IEC 98A bewertet) (getestetes System: SP-10MK3 + SH-10B5 + EPA-250 + EPC-100CMK3)
Rumpel-Fremdspannungsabstand: –92 dB DIN B (IEC 98A bewertet)
Rumpel-Geräuschspannungsabstand: –60 dB DIN A (IEC 98A unbewertet)

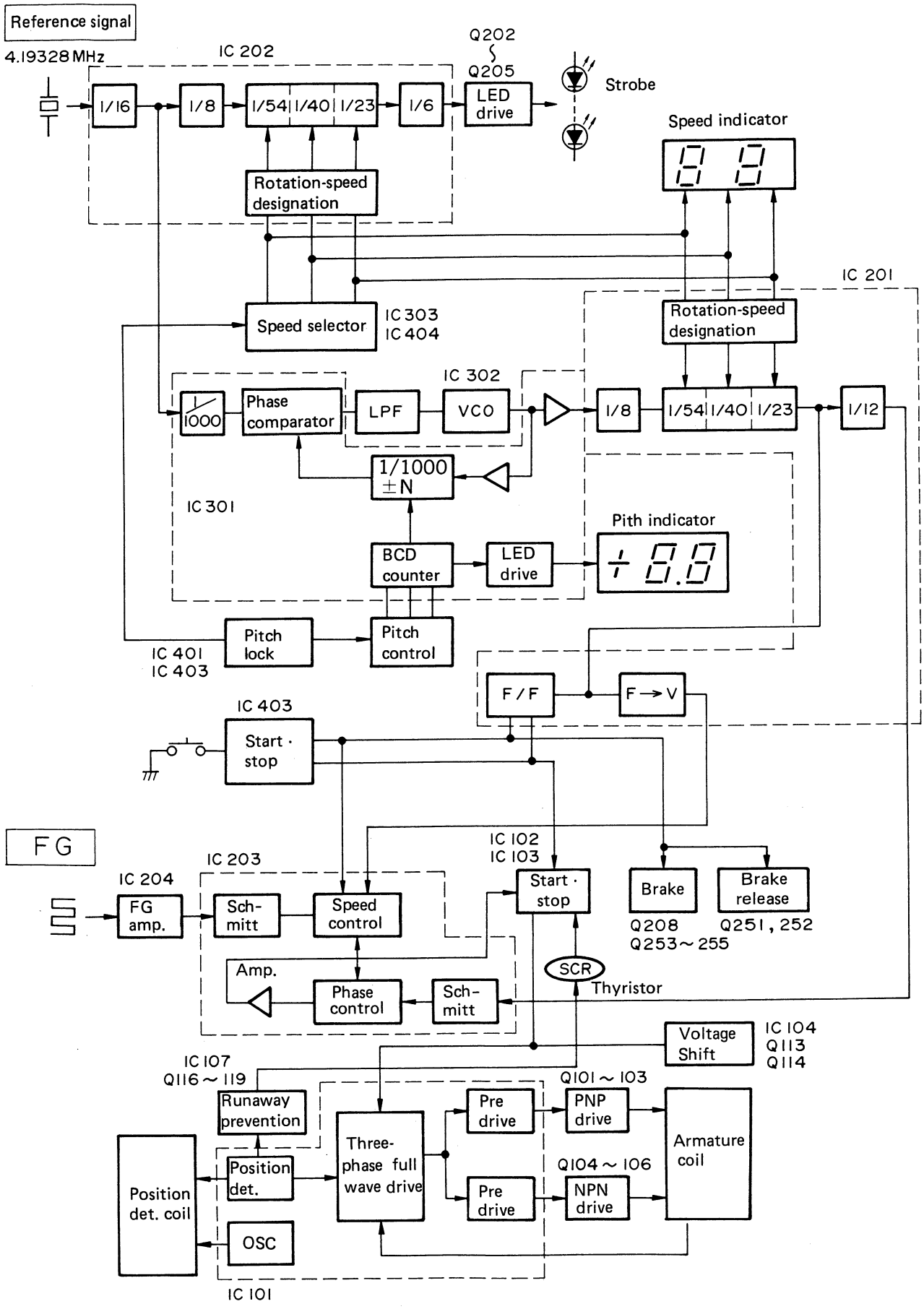
■ JUSTIERUNGEN

• Zu verwendende Instrumente und Einstellungen

1. Gleichstrom-Voltmeter
2. Oszilloskop
3. Gleichstromversorgung
4. Den Drehzahlregler auf 0% einstellen.

Gegenstand	Vorbereitungen	Zu justierende Teile	Justiermethode
Konstantspannungs-Stromversorgung	1. Die Anschlüsse CN1, CN2 und CN3 herausziehen. 2. Das Gleichstrom-Voltmeter entweder an den CN1-Anschluß ③ (+) und BT1-Anschluß ③ (–) oder die negative Seite von C3 anschließen. 3. Den Netzschalter einschalten.	VR1	1. VR1 auf einen Ausgang von 31,8V abgleichen.
	1. Die Anschlüsse CN1, CN2 und CN3 herausziehen. 2. Das Gleichstrom-Voltmeter entweder an den CN1-Anschluß ③ (+) und BT1-Anschluß ③ (–) oder die negative Seite von C3. 3. Den Netzschalter einschalten.	VR2	1. VR2 auf einen Ausgang von –31,8V abgleichen.
Kristalloszillation	1. Das Oszilloskop an IC202 Stift ⑦ und den Erdungsanschluß anschließen. 2. Den Netzschalter einschalten.	C211	1. C211 so justieren, daß der Zyklus 3,81 µsec (262,08kHz) beträgt.

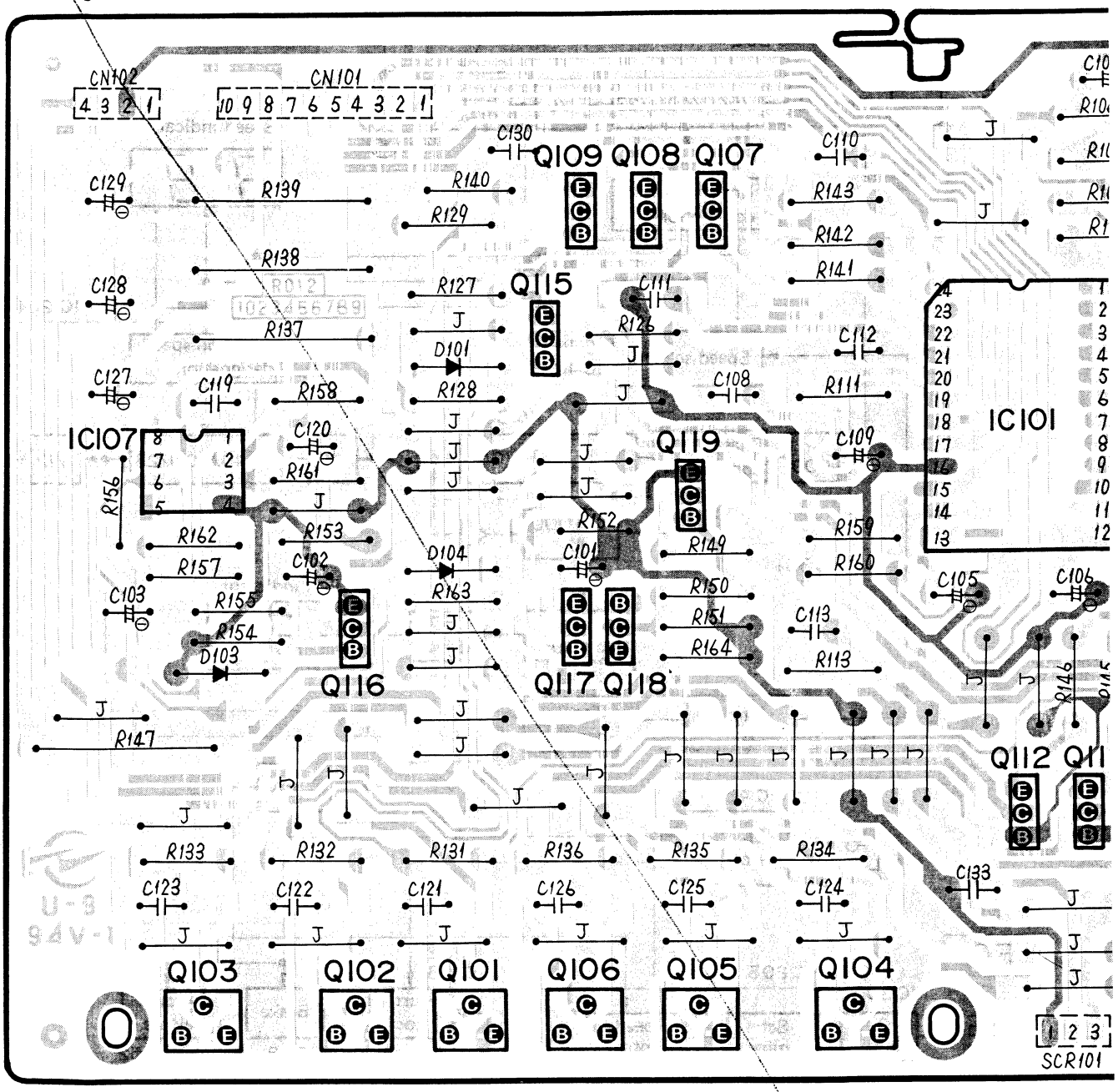
■ BLOCK DIAGRAM



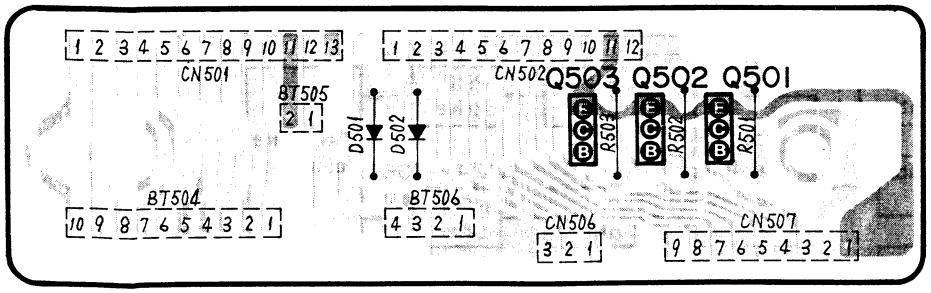
■ PRINTED CIRCUIT BOARDS

Ground (Earth) lines

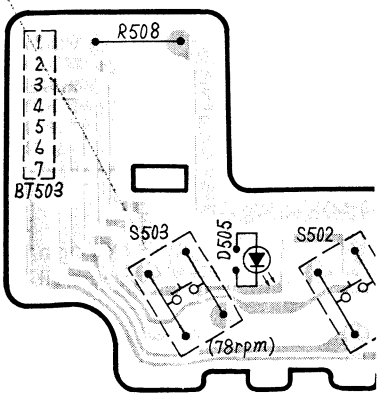
- Driving circuit



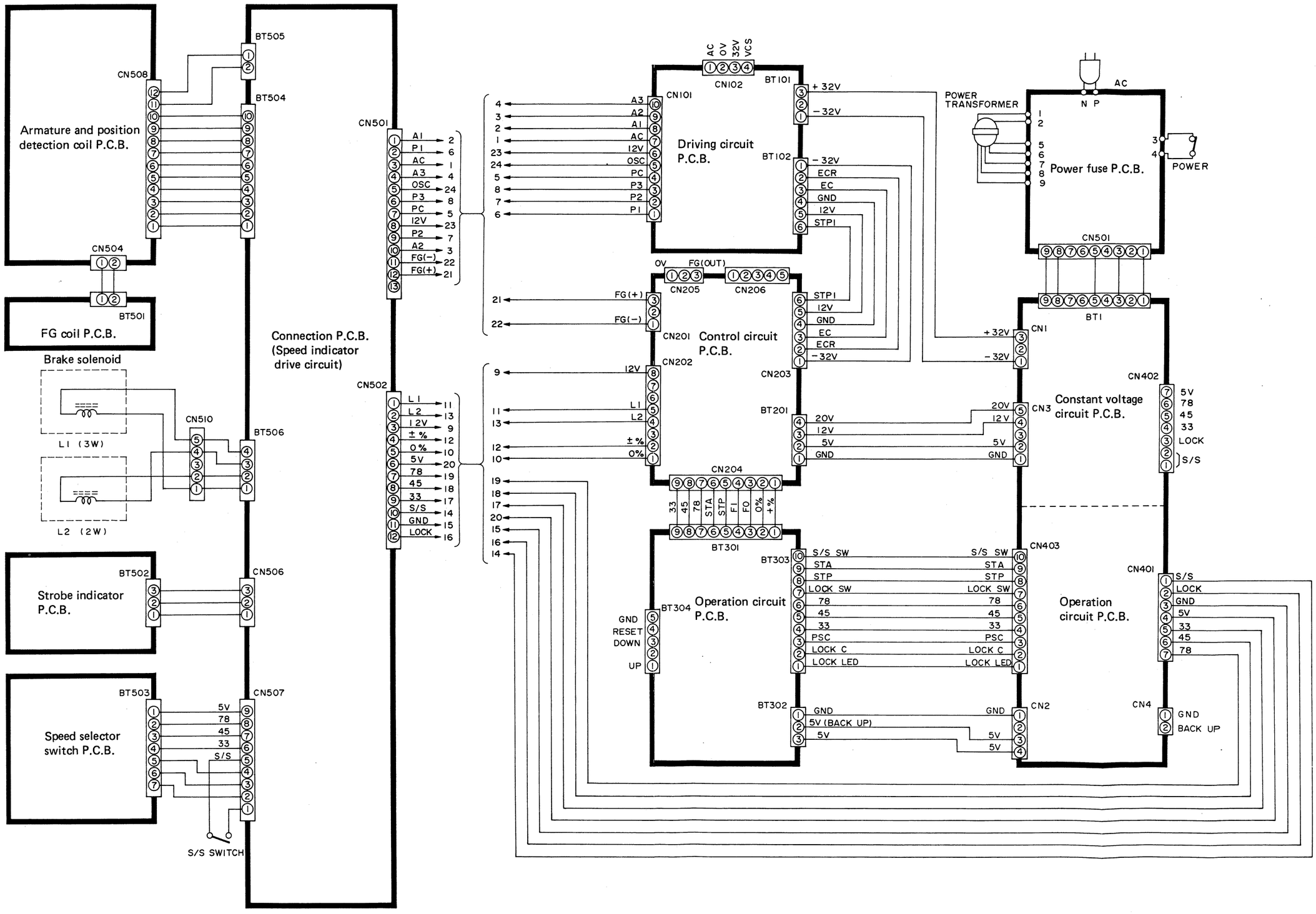
- Connection board (Speed indicator drive circuit)

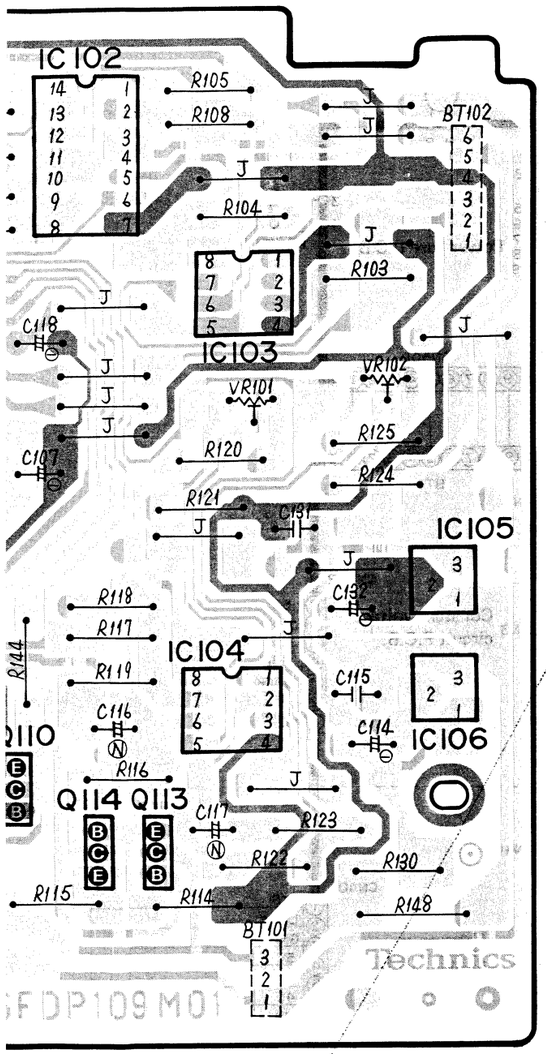


- Speed selector switch circui

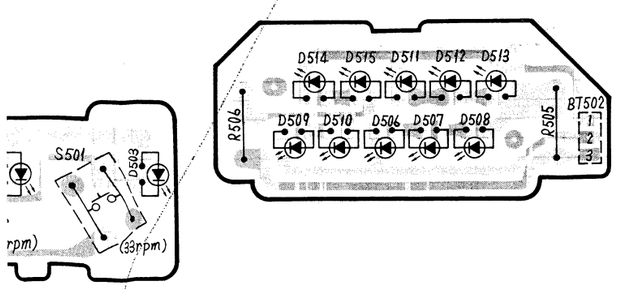


■ PRINTED CIRCUIT BOARD WIRING CONNECTION DIAGRAM

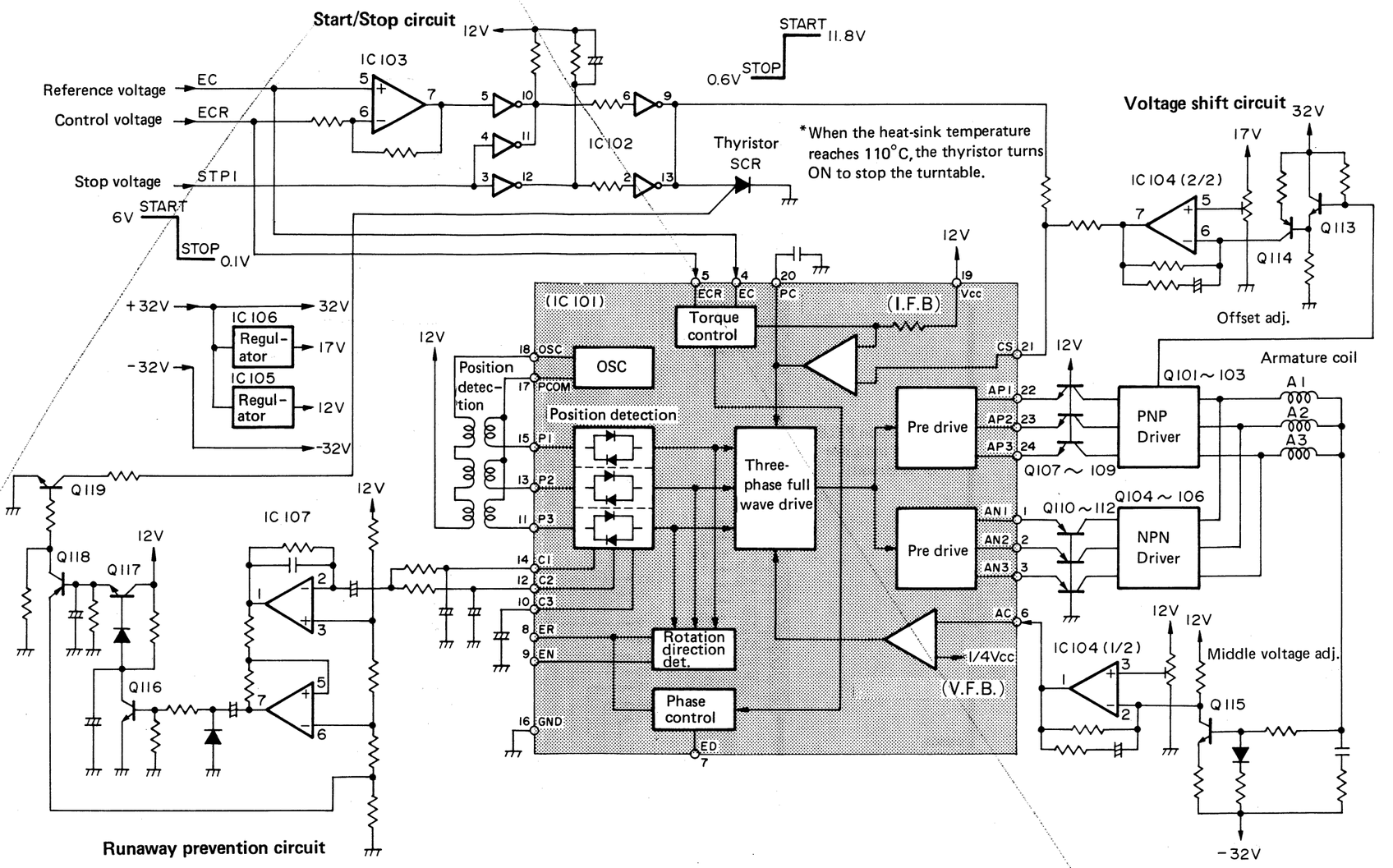




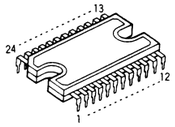
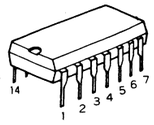
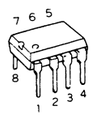
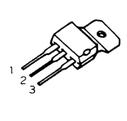
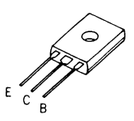
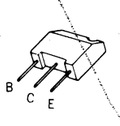
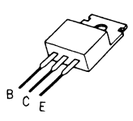
- **Strobe indicator circuit**



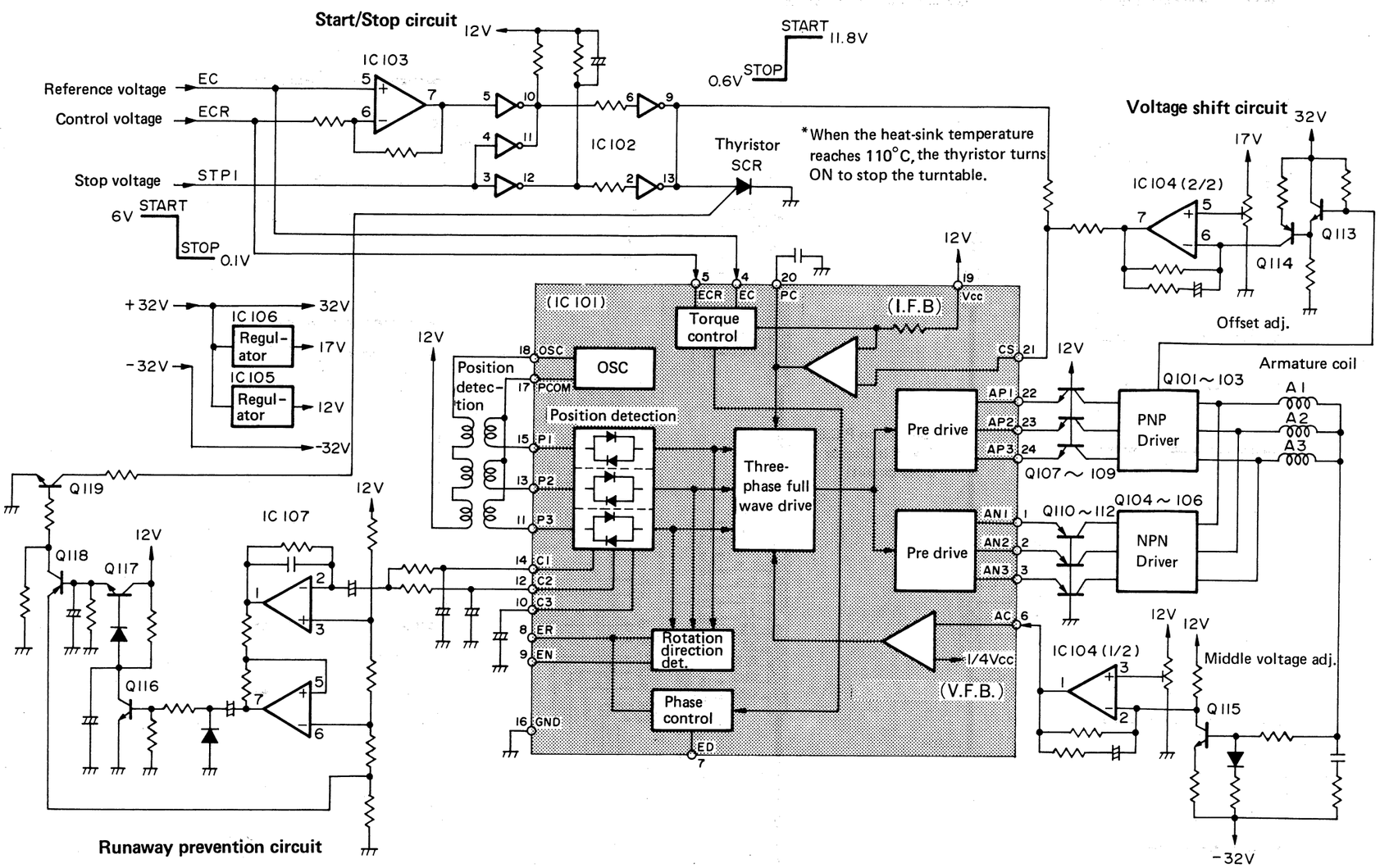
- **Block diagram of driving circuit**



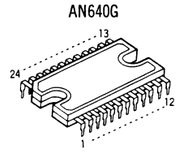
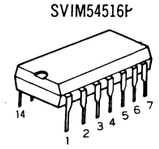
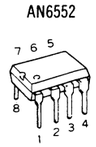
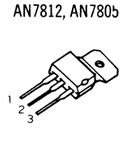
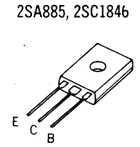
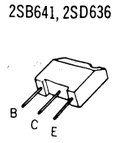
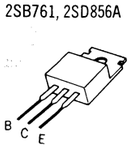
- **Terminal guide of IC and transistors**

AN640G	SVIM54516F	AN6552	AN7812, AN7805	2SA885, 2SC1846	2SB641, 2SD636	2SB761, 2SD856A
						

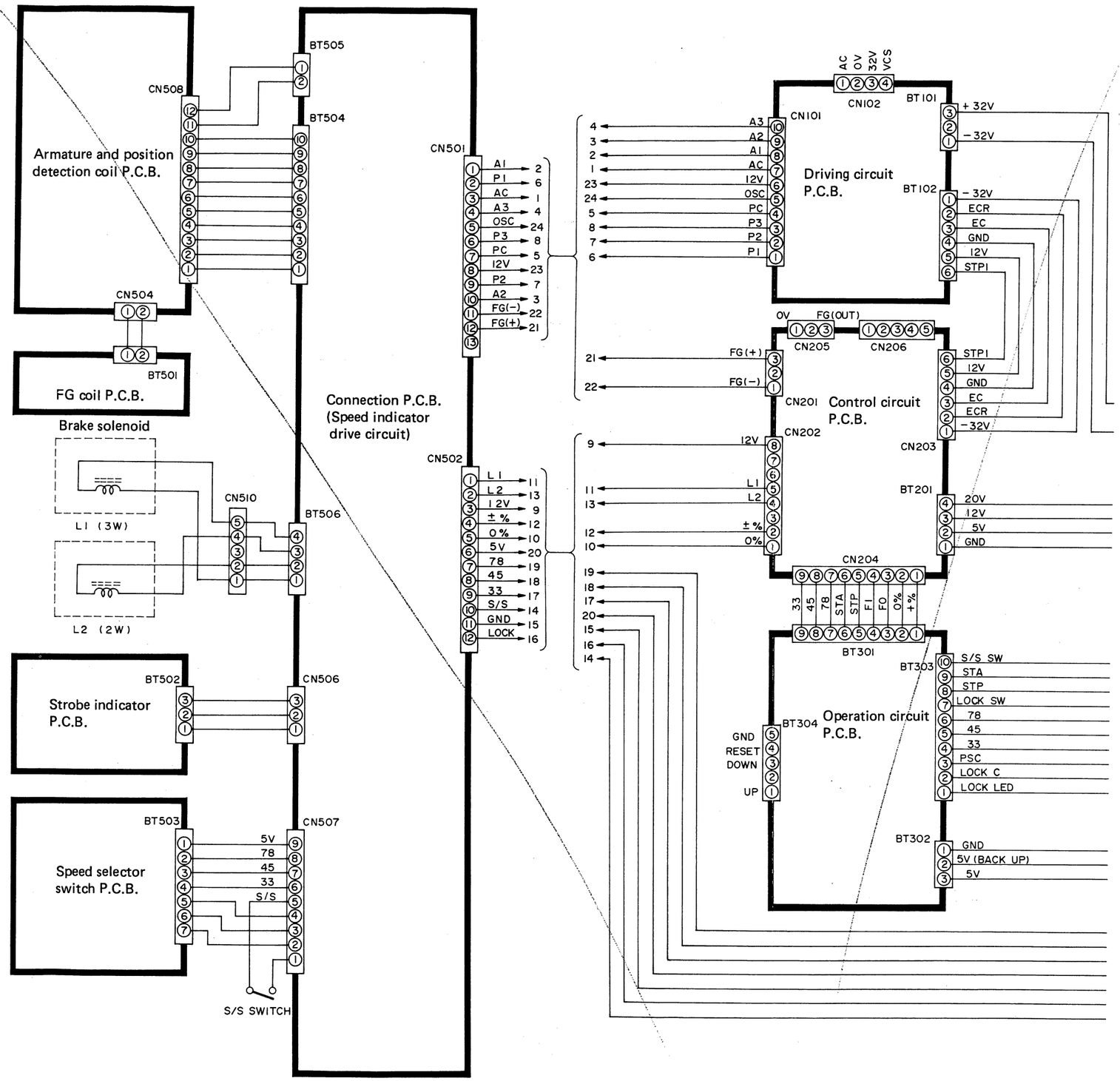
- **Block diagram of driving circuit**



- **Terminal guide of IC and transistors**

AN640G	SVIM54516F	AN6552	AN7812, AN7805	2SA885, 2SC1846	2SB641, 2SD636	2SB761, 2SD856A
						

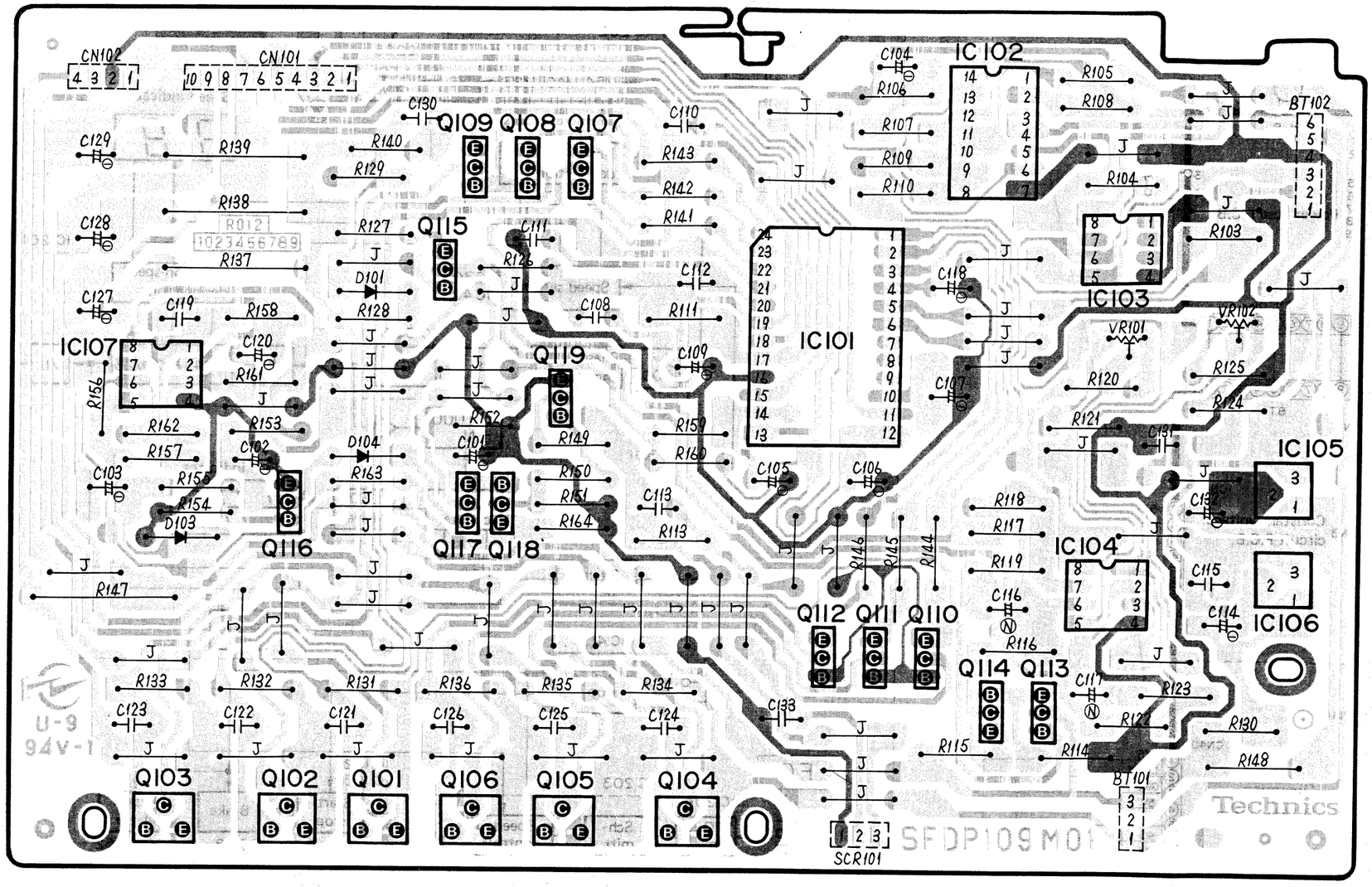
■ PRINTED CIRCUIT BOARD WIRING CONNECTION DIAGRAM



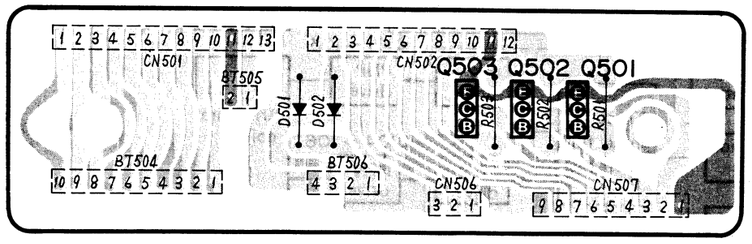
■ PRINTED CIRCUIT BOARDS

GND Ground (Earth) lines

- **Driving circuit**

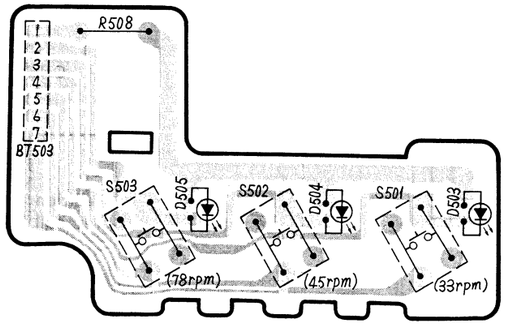


- **Connection board (Speed indicator drive circuit)**

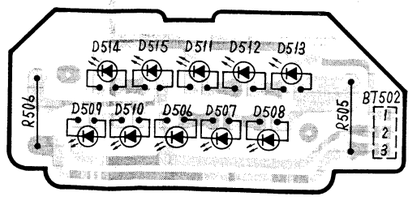


B5

- **Speed selector switch circuit**



- **Strobe indicator circuit**



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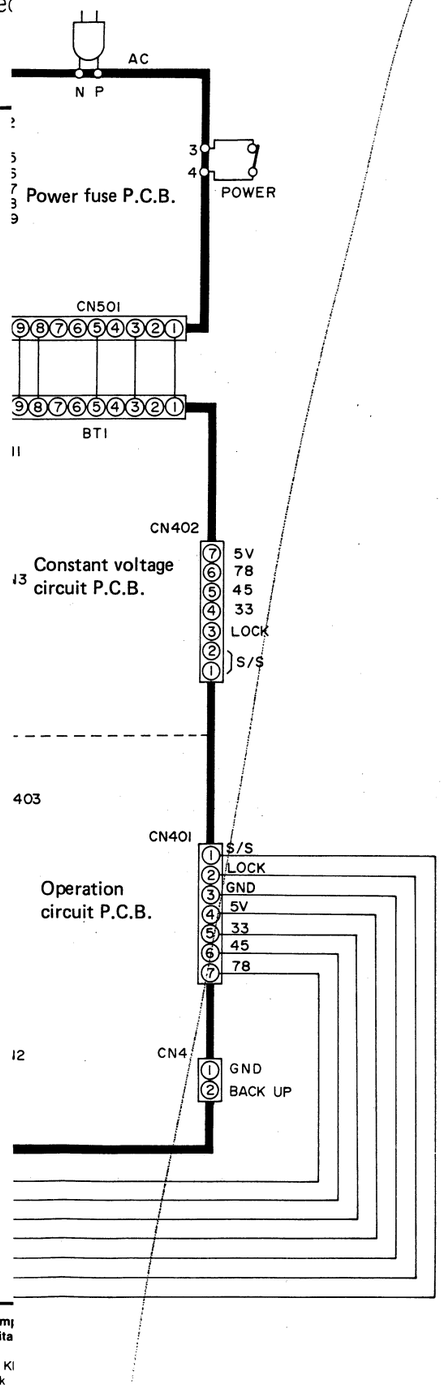

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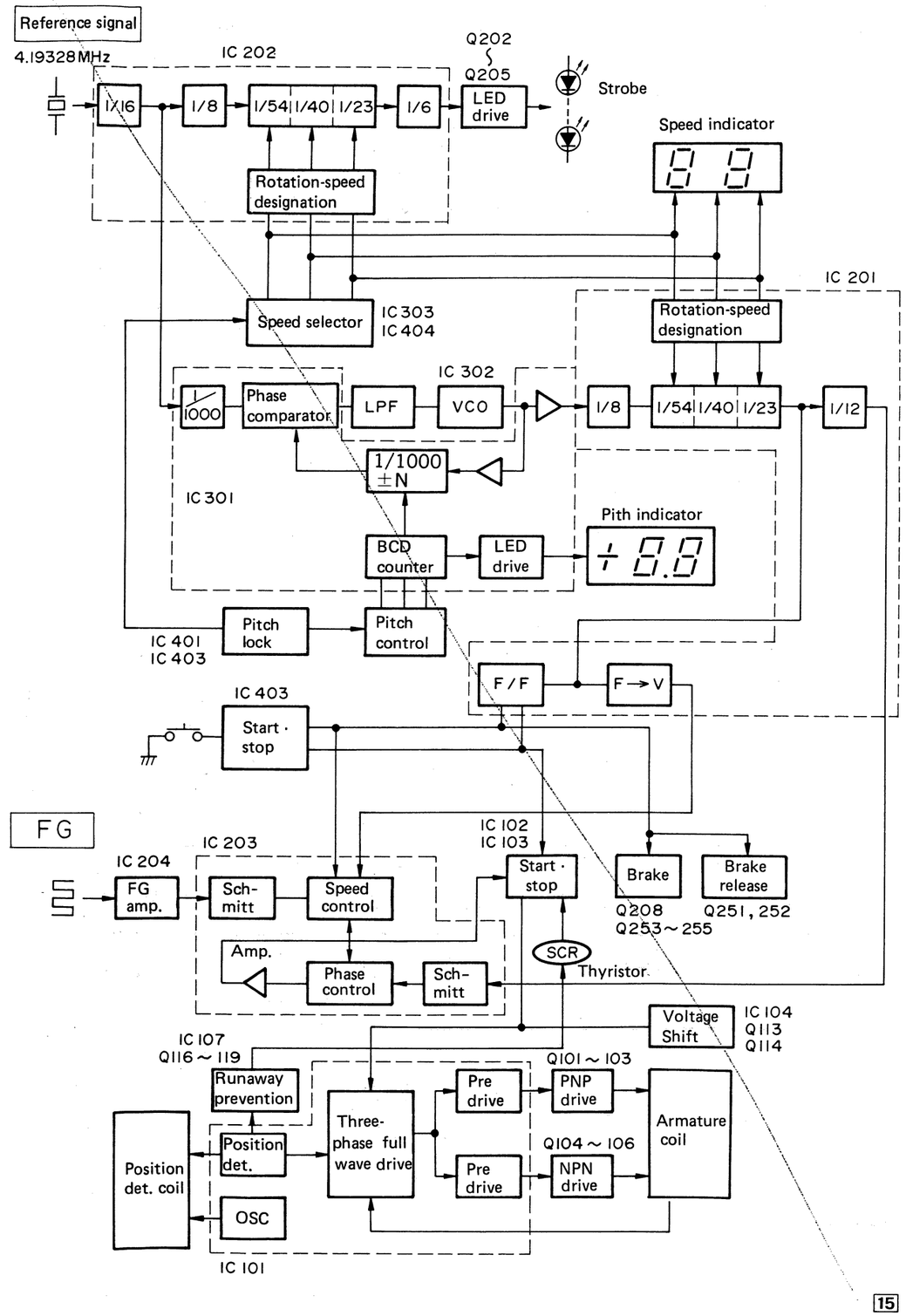
■ BLOCK DIAGRAM

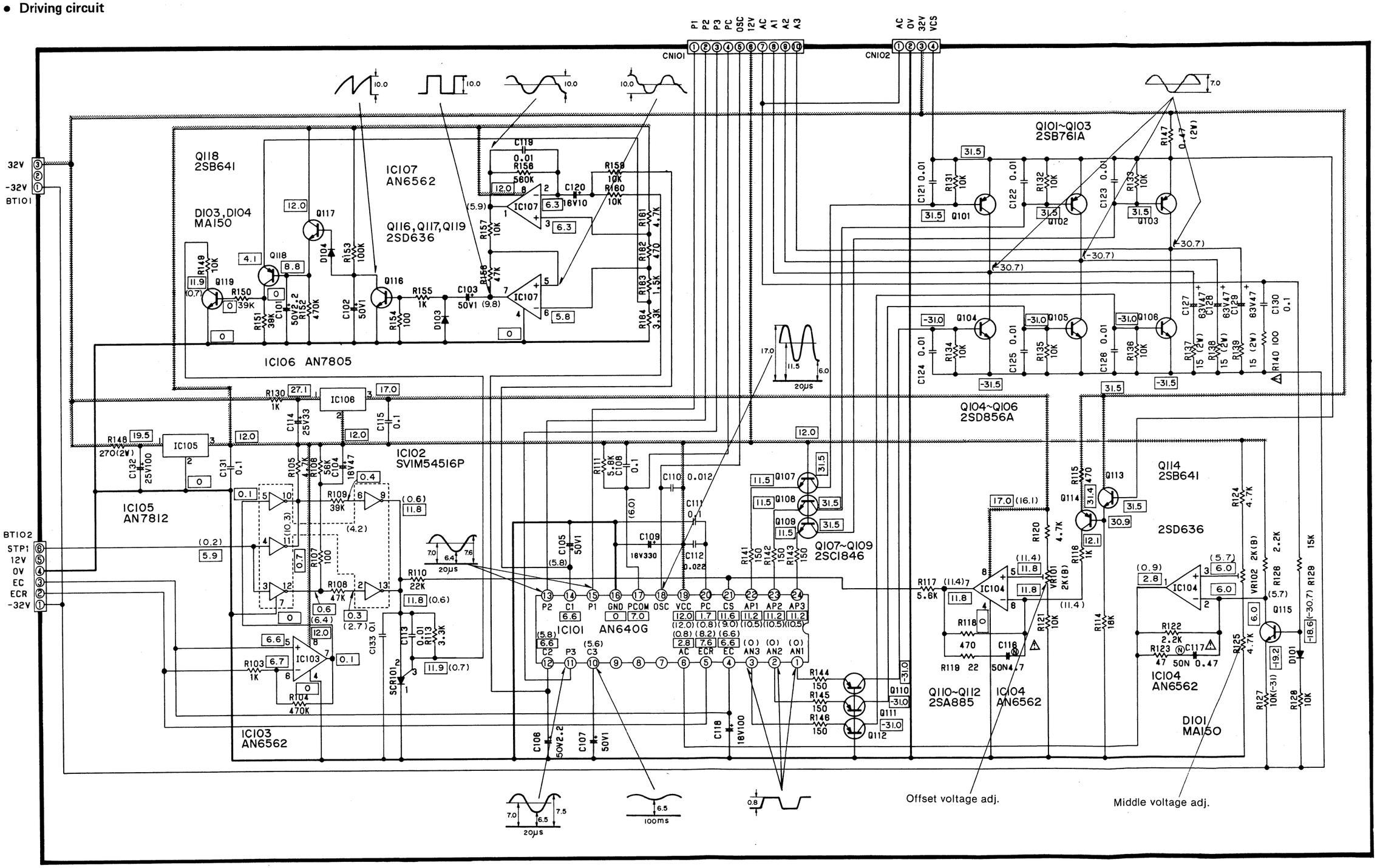


■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

1 2 3 4 5 6 7 8 9

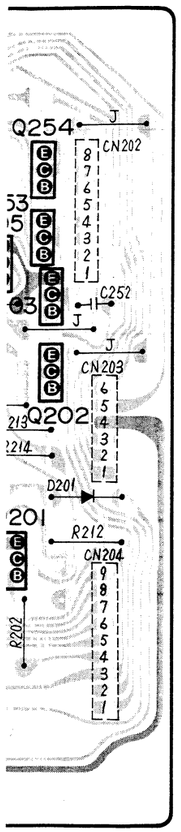
A B C D E F

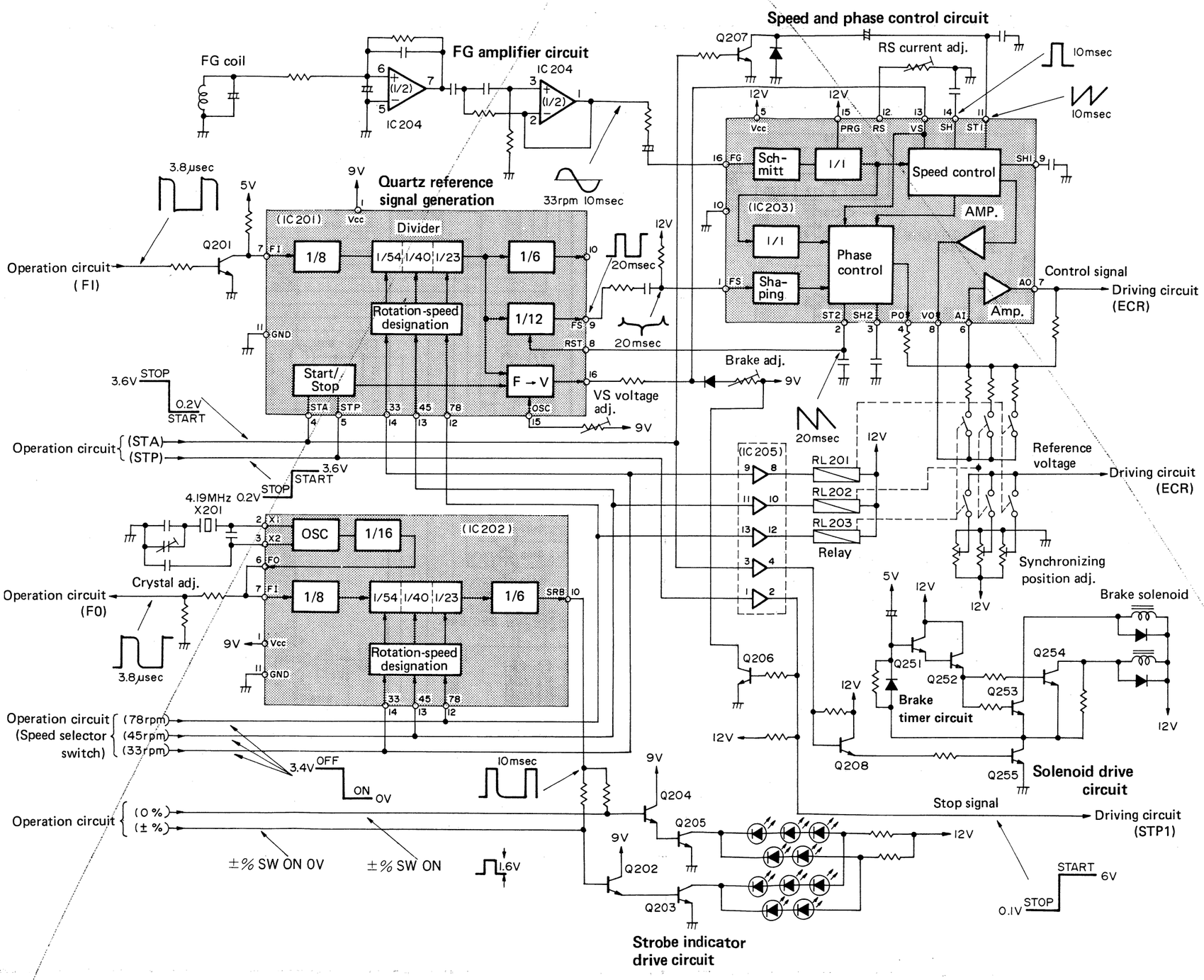
• **Driving circuit**



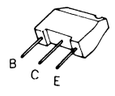
B7 B8

• Block diagram of control circuit





2SD636, 2SD638



• Reference voltage and waveform at each IC pin

IC201 DN860

No	STOP	ROTATION(START)
1	9.0	9.0
4	3.6	0.2
5	0.2	3.6
7		3.8 3.8μsec
8	0	7.7 ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
9	4.2	4.2 ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
11	0	0
12	33,45rpm 3.6	78rpm 0.2
13	33,78 〃 3.6	45 〃 0.2
14	45,78 〃 3.6	33 〃 0.2
15		6.0 ·33rpm 20msec ·45rpm 15msec ·78rpm 8msec
16	0.2	6.3 ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃

IC202 DN860

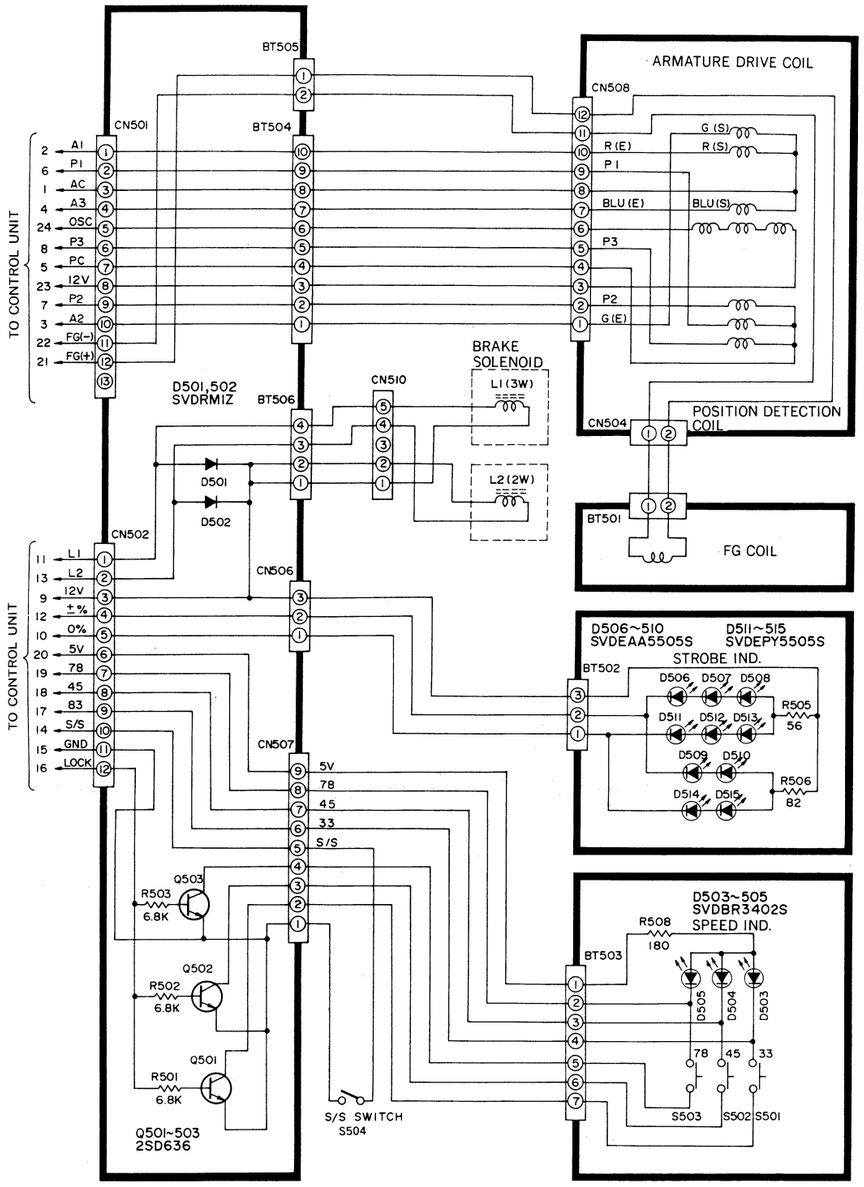
No	STOP	ROTATION(START)
1	9.0	9.0
2		1.2 1.2 0.25μsec
3		0.6 0.6 0.25μsec
6 7		4.0 3.8μsec
10		3.0 ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃
11	0	
12	33,45rpm 3.6	78rpm 0.2
13	33,78 〃 3.6	45 〃 0.2
14	45,78 〃 3.6	33 〃 0.2

IC203 AN660

No	STOP	ROTATION(START)
1	11.8	4.0 11.8 ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
2	0	7.7 2 ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
3	6.0	5.0
4	6.2	6.2
5	12.0	12.0
6	6.4	6.4
7	8.2	6.7
8	5.2	6.4
9	7.6	6.4
10	0	0
11	7.8	6.5 ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃
12	2.6	(33) 2.2 (45) 3.0 (78) 5.0
13	2.6	(33) 2.2 (45) 3.0 (78) 5.0
14	7.5	7.8 ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃
15	12.0	12.0
16	5.8	3.5 4.0 ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃

11 12 13 14

- **Turntable unit (Speed selector, strobe indicator and motor coil circuit)**



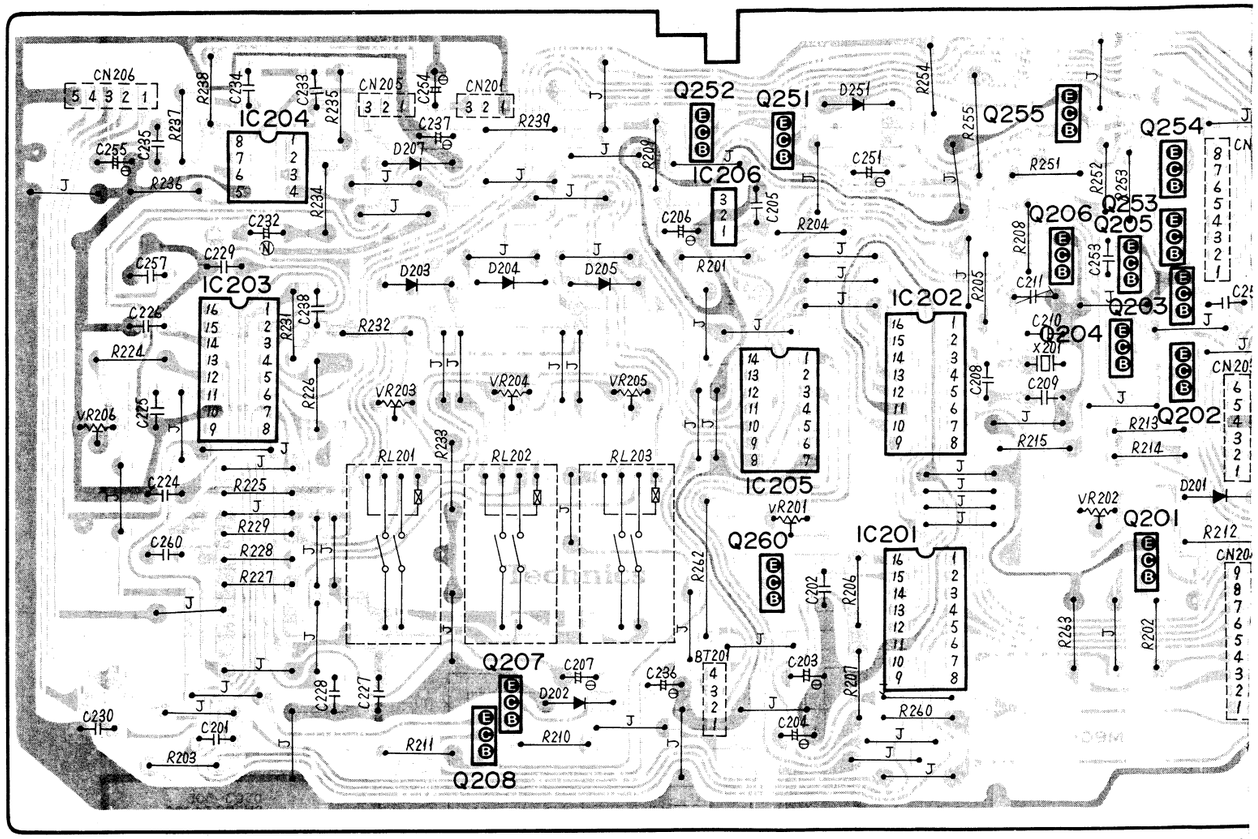
Notes:

1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
   * Those in ( ) are voltage in stop.
   * Those in [ ] are voltage in rotation.
2. ⋯⋯ positive voltage lines.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
4. **S501** : Speed selector (33 rpm) switch.
5. **S502** : Speed selector (45 rpm) switch.
6. **S503** : Speed selector (78 rpm) switch.
7. **S504** : Start/stop switch.

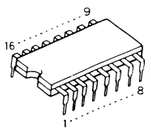
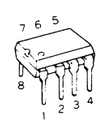
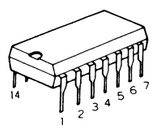
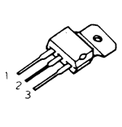
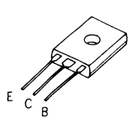
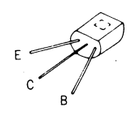
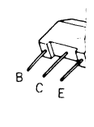
■ PRINTED CIRCUIT BOARD

Ground (Earth) lines

- **Control circuit**

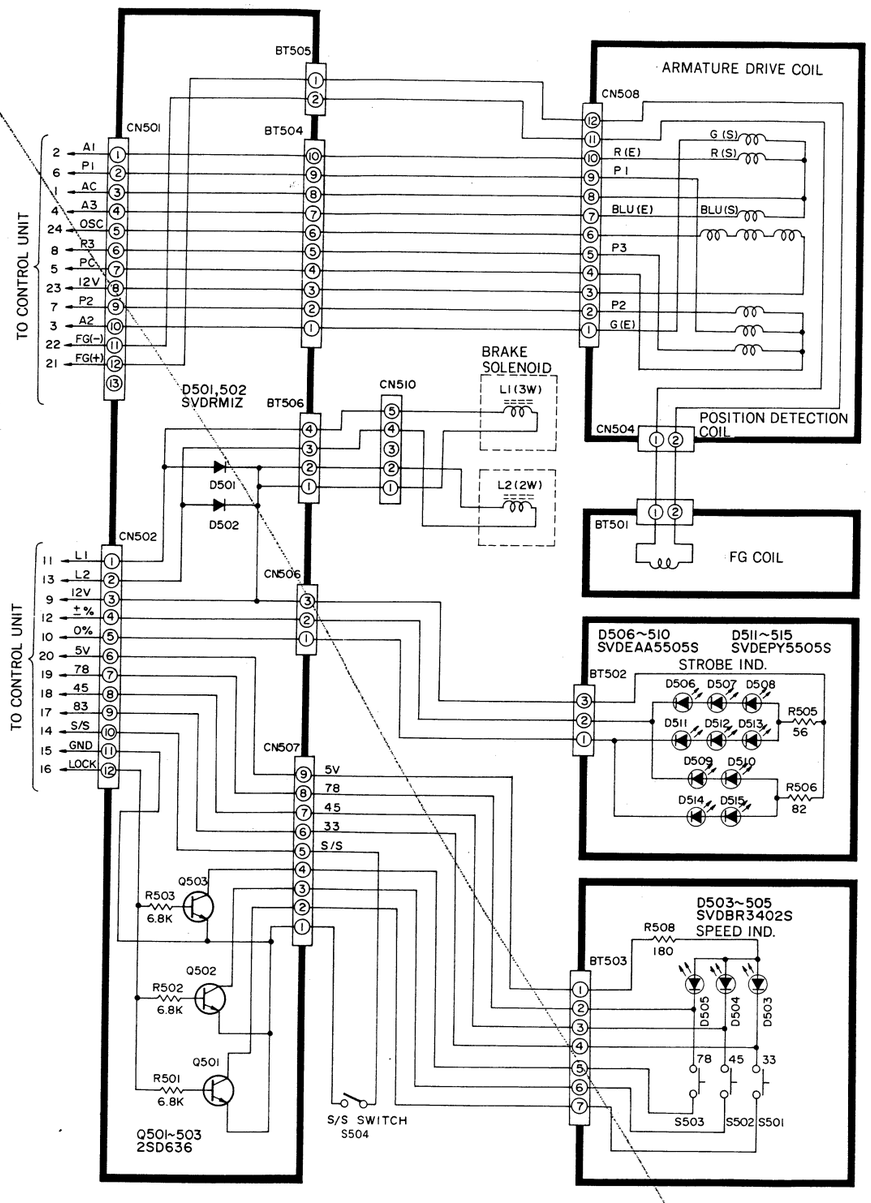


- **Terminal guide of IC and transistors**

DN860, AN660	AN6552F	SVIM53217P	SVITA78L009	2SC1846	2SC1047	2SD636, 2SI
						

10 11 12 13 14

• Turntable unit (Speed selector, strobe indicator and motor coil circuit)



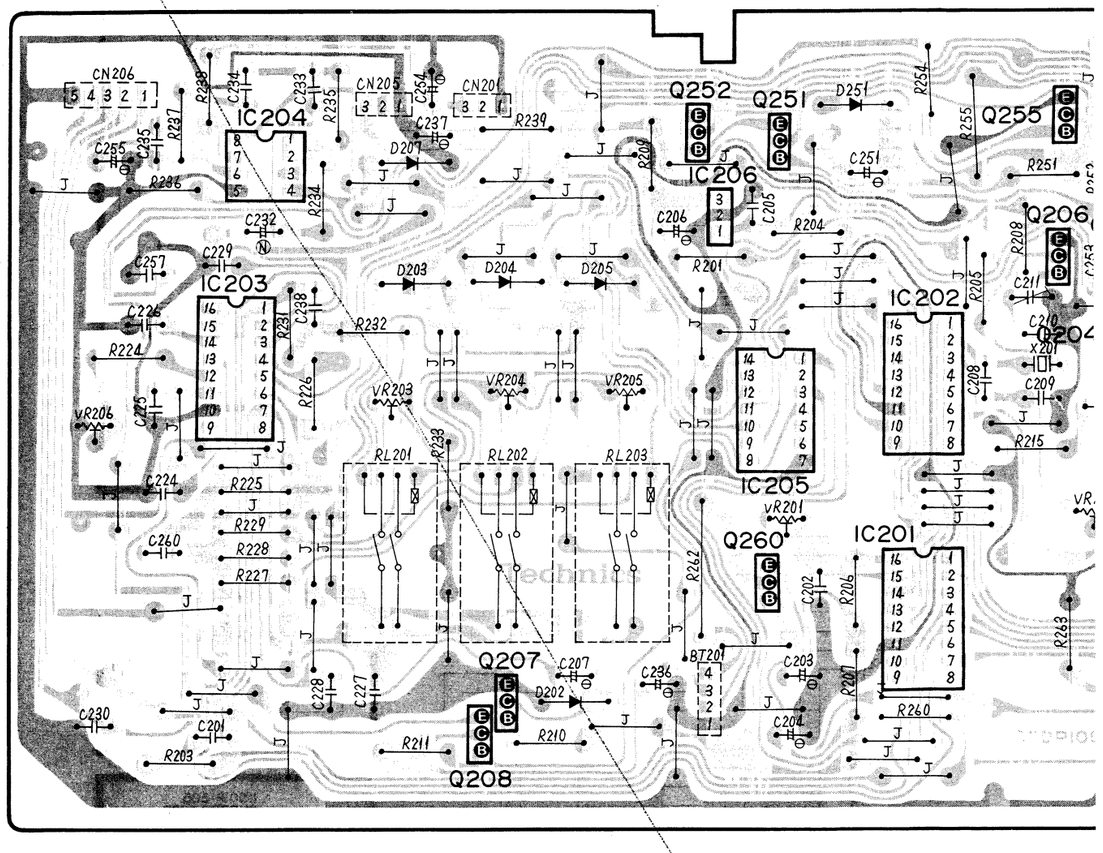
Notes:

1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
   * Those in ( ) are voltage in stop.
   * Those in [ ] are voltage in rotation.
2. ..... positive voltage lines.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
4. **S501** : Speed selector (33 rpm) switch.
5. **S502** : Speed selector (45 rpm) switch.
6. **S503** : Speed selector (78 rpm) switch.
7. **S504** : Start/stop switch.

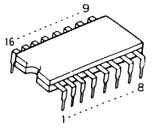
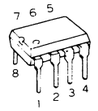
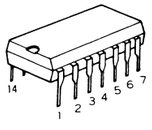
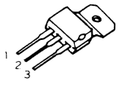
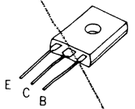
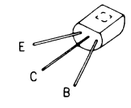
■ PRINTED CIRCUIT BOARD

Ground (Earth) lines

• Control circuit

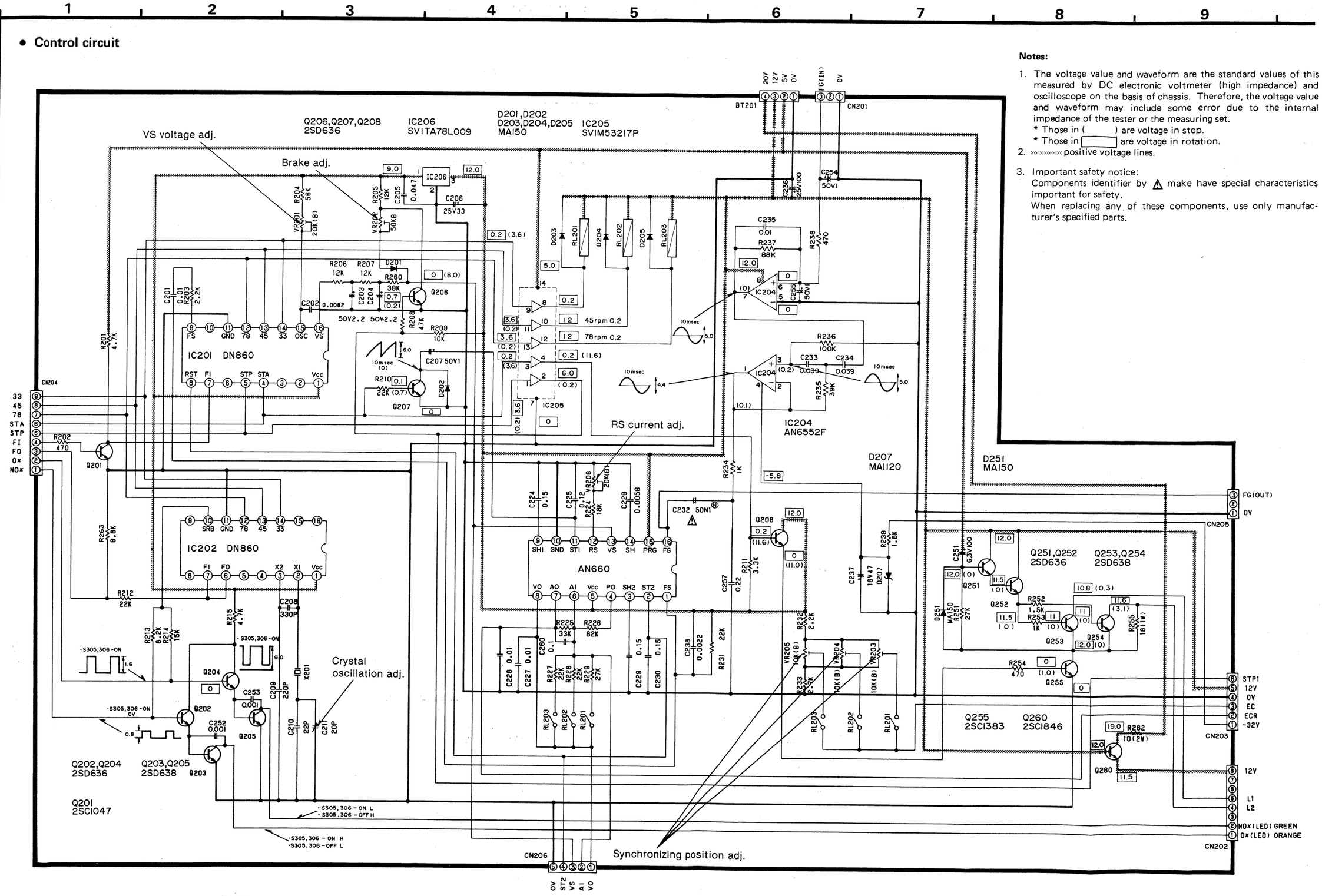


• Terminal guide of IC and transistors

DN860, AN660	AN6552F	SVIM53217P	SVITA78L009	2SC1846	2SC1047
					

■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

• **Control circuit**



Notes:

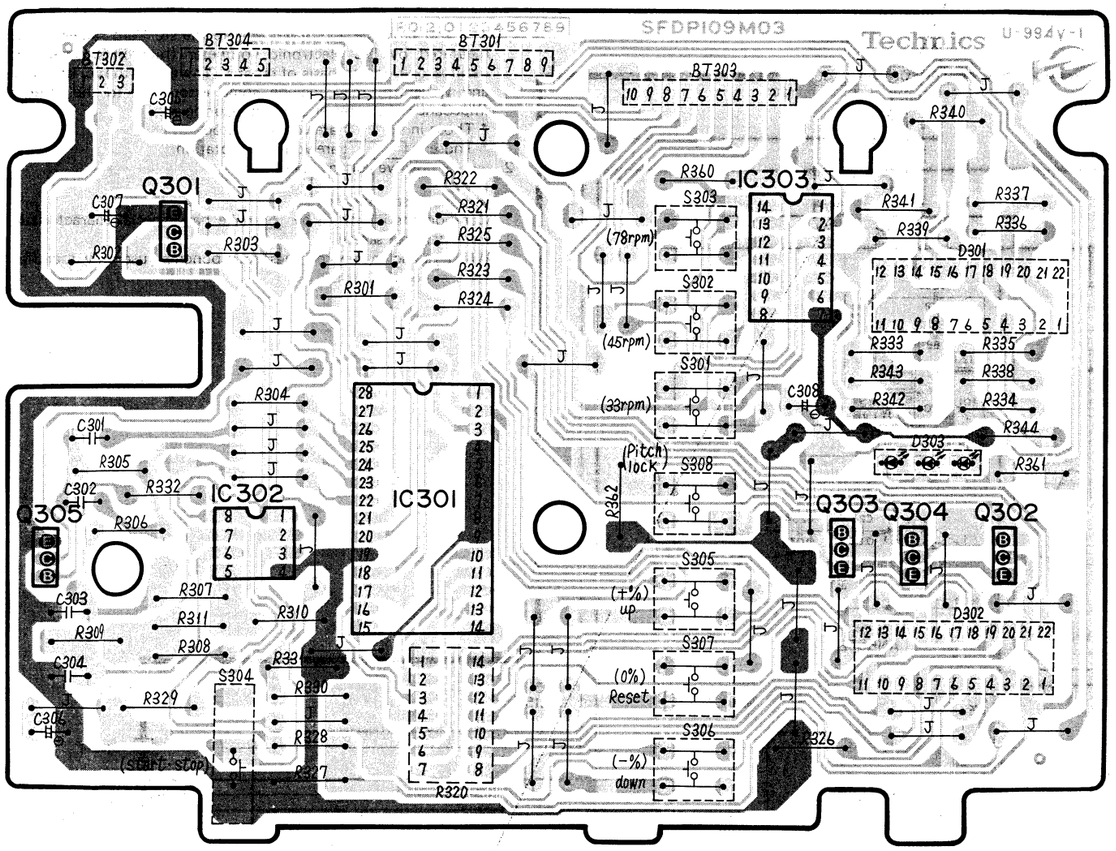
1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
   * Those in ( ) are voltage in stop.
   * Those in [ ] are voltage in rotation.
2. ⋯⋯ positive voltage lines.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.

B11 B12

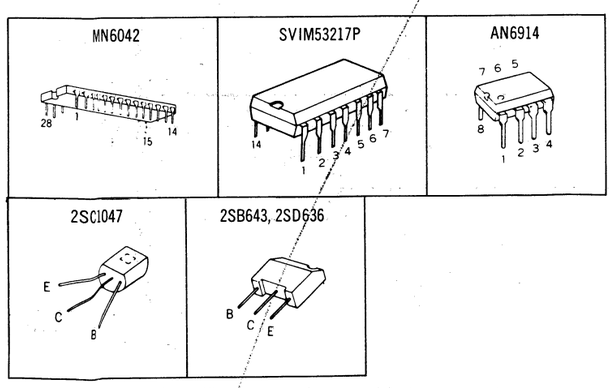
■ PRINTED CIRCUIT BOARD

Ground (Earth) lines

- Operation circuit

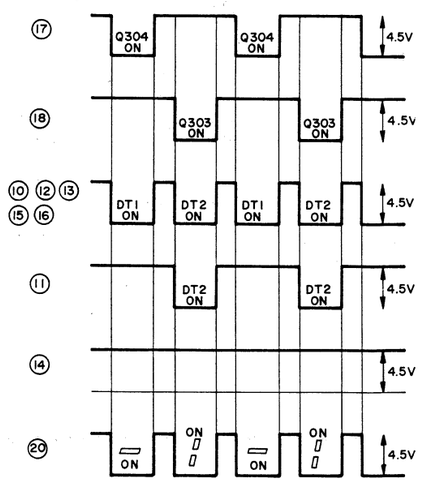


- Terminal guide of IC and transistors

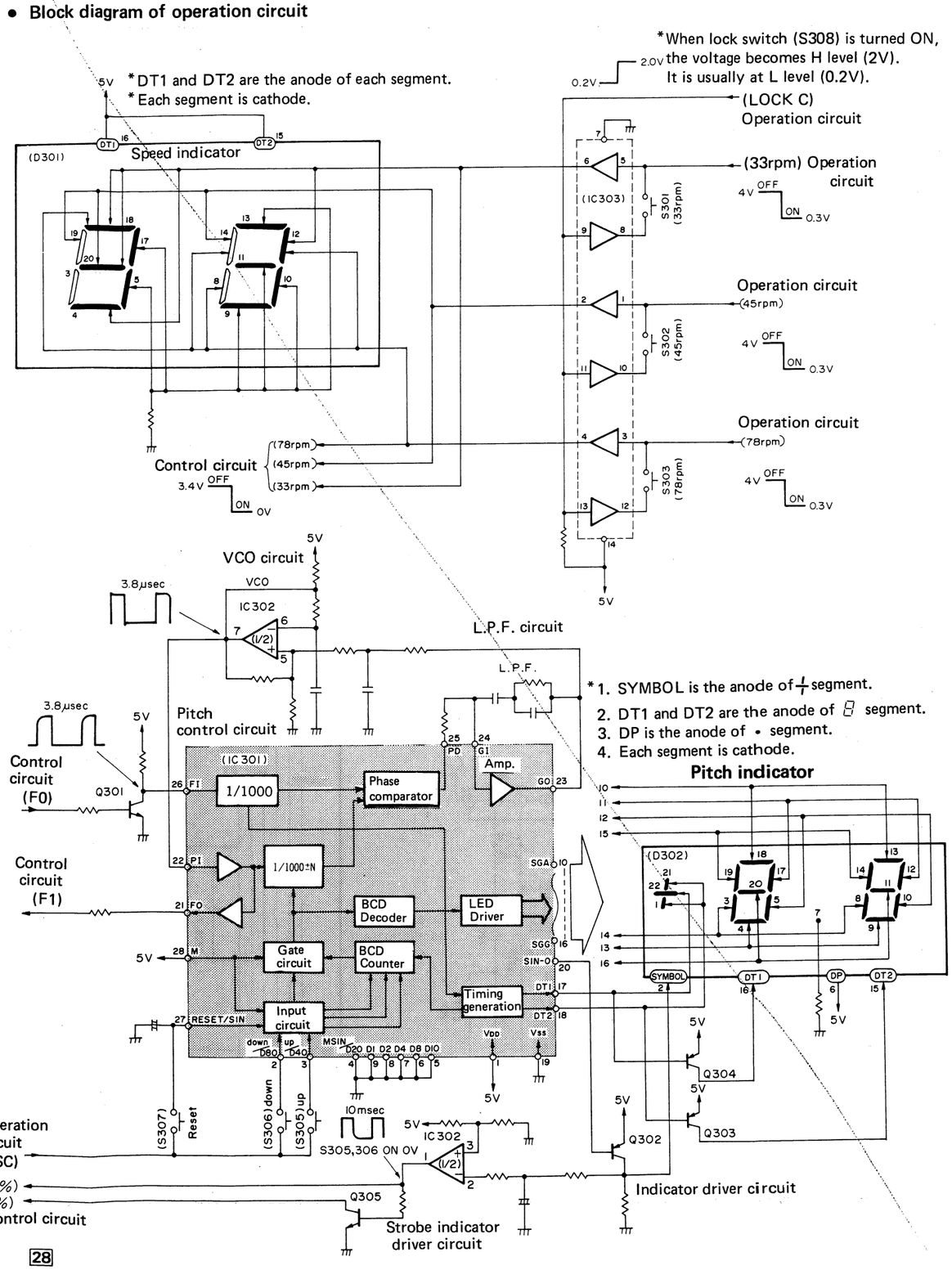


- Timing chart (When the pitch has been set to +5.9%)

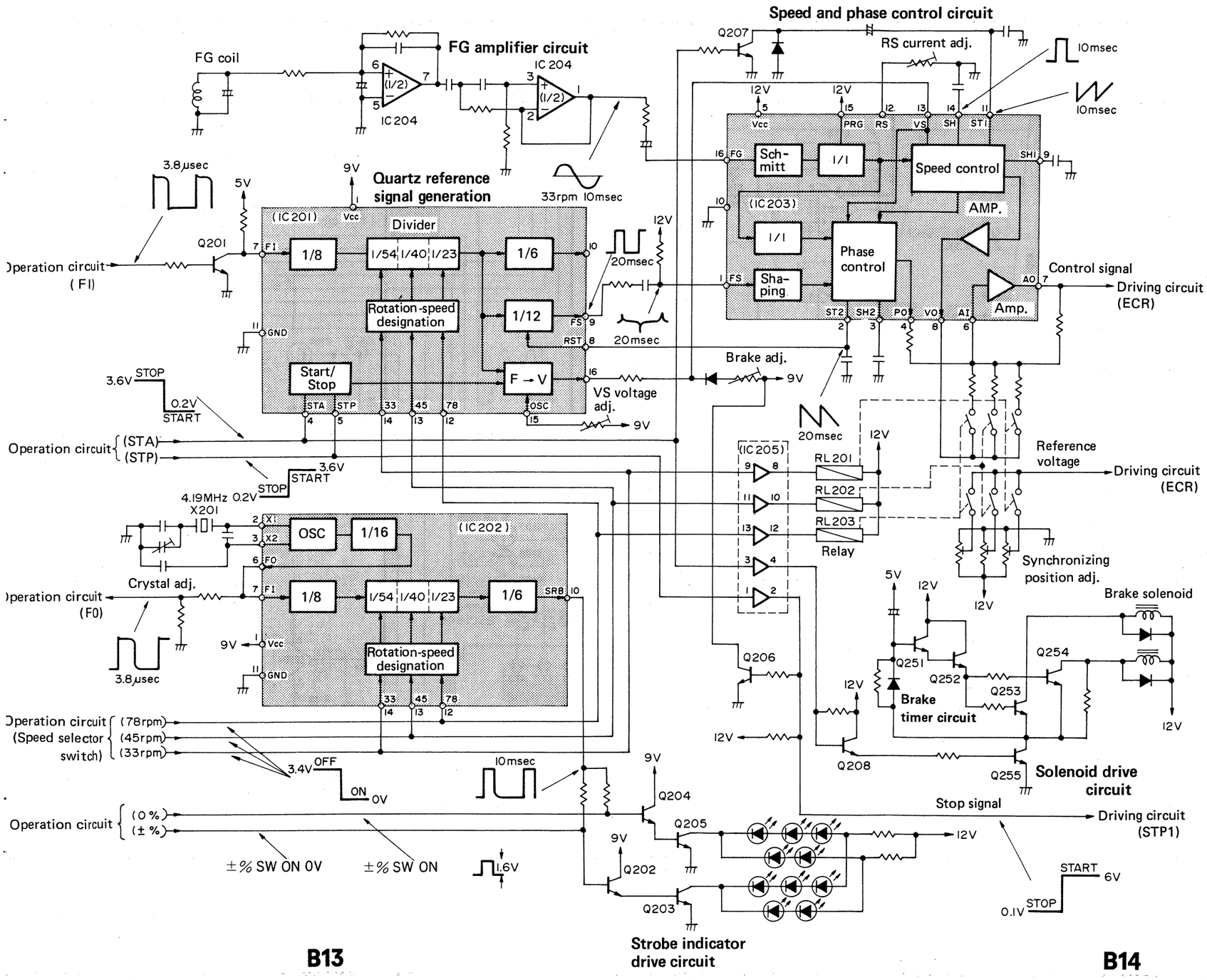
IC301 pin number



- Block diagram of operation circuit



Block diagram of control circuit



B13

B14

• Reference voltage and waveform at each IC pin

IC201 DN860

No	STOP	ROTATION(START)
1	9.0	9.0
4	3.6	0.2
5	0.2	3.6
7		3.8 / 3.8μsec
8	0	7.7 / ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
9	4.2	4.2 / ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
11	0	0
12	33,45rpm	3.6 78rpm 0.2
13	33,78 〃	3.6 45 〃 0.2
14	45,78 〃	3.6 33 〃 0.2
15		·33rpm 20msec / 6.0 / ·45rpm 15 msec / ·78rpm 8msec
16	0.2	6.3 / ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃

IC202 DN860

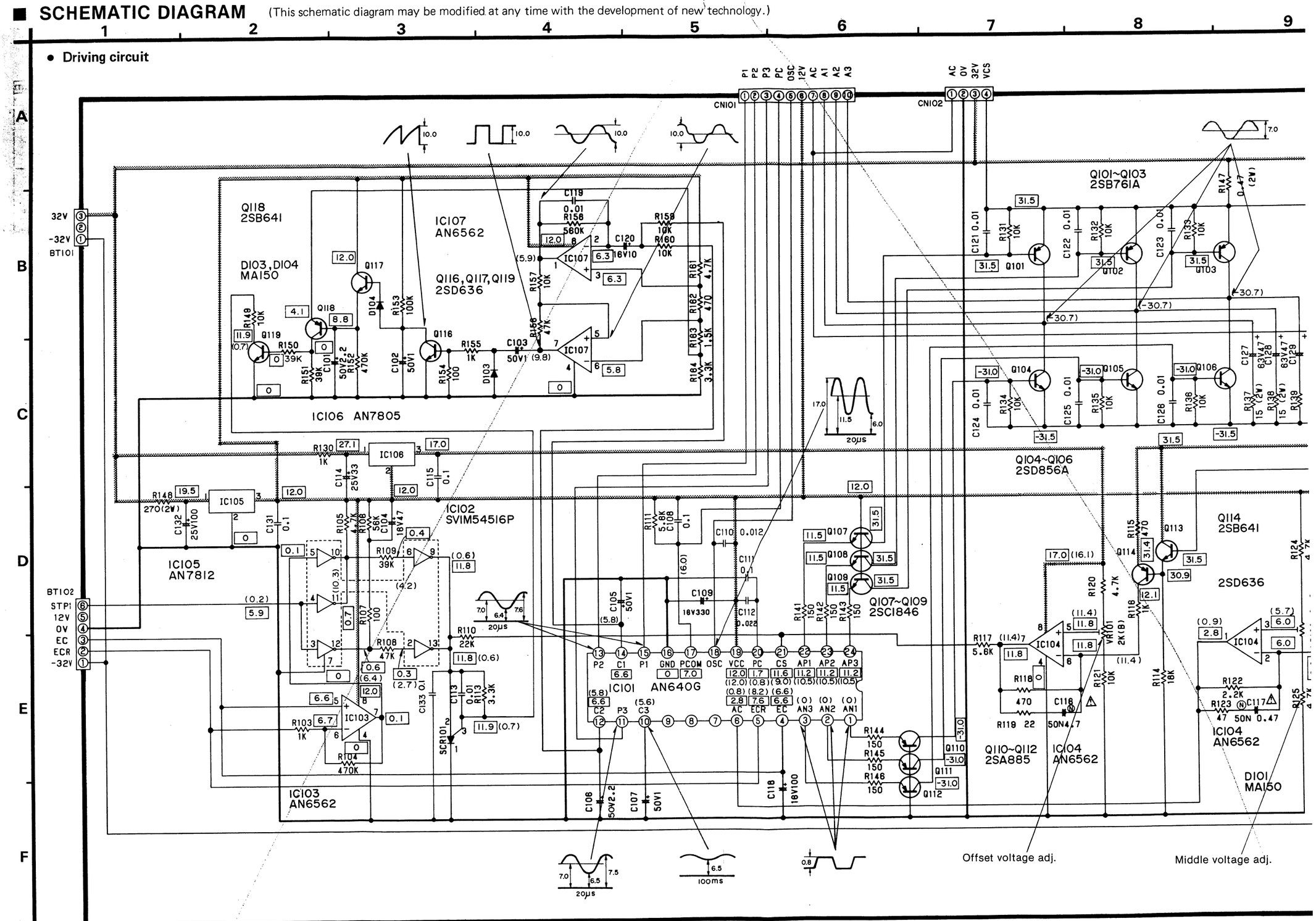
No	STOP	ROTATION(START)
1	9.0	9.0
2		1.2 / 0.25μsec / 1.2
3		0.6 / 0.25μsec / 0.6
6 7		4.0 / 3.8μsec
10		3.0 / ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃
11	0	
12	33,45rpm	3.6 78rpm 0.2
13	33,78 〃	3.6 45 〃 0.2
14	45,78 〃	3.6 33 〃 0.2

IC203 AN660

No	STOP	ROTATION(START)
1	11.8	11.8 / 4.0 / ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
2	0	7.7 / ·33rpm 20msec ·45 〃 15 〃 ·78 〃 8 〃
3	6.0	5.0
4	6.2	6.2
5	12.0	12.0
6	6.4	6.4
7	8.2	6.7
8	5.2	6.4
9	7.6	6.4
10	0	0
11	7.8	6.5 / ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃
12	2.6	(33) 2.2 45 3.0 78 5.0
13	2.6	(33) 2.2 45 3.0 78 5.0
14	7.5	7.8 / ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃
15	12.0	12.0
16	5.8	3.5 / 4.0 / ·33rpm 10msec ·45 〃 7.5 〃 ·78 〃 4 〃

■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

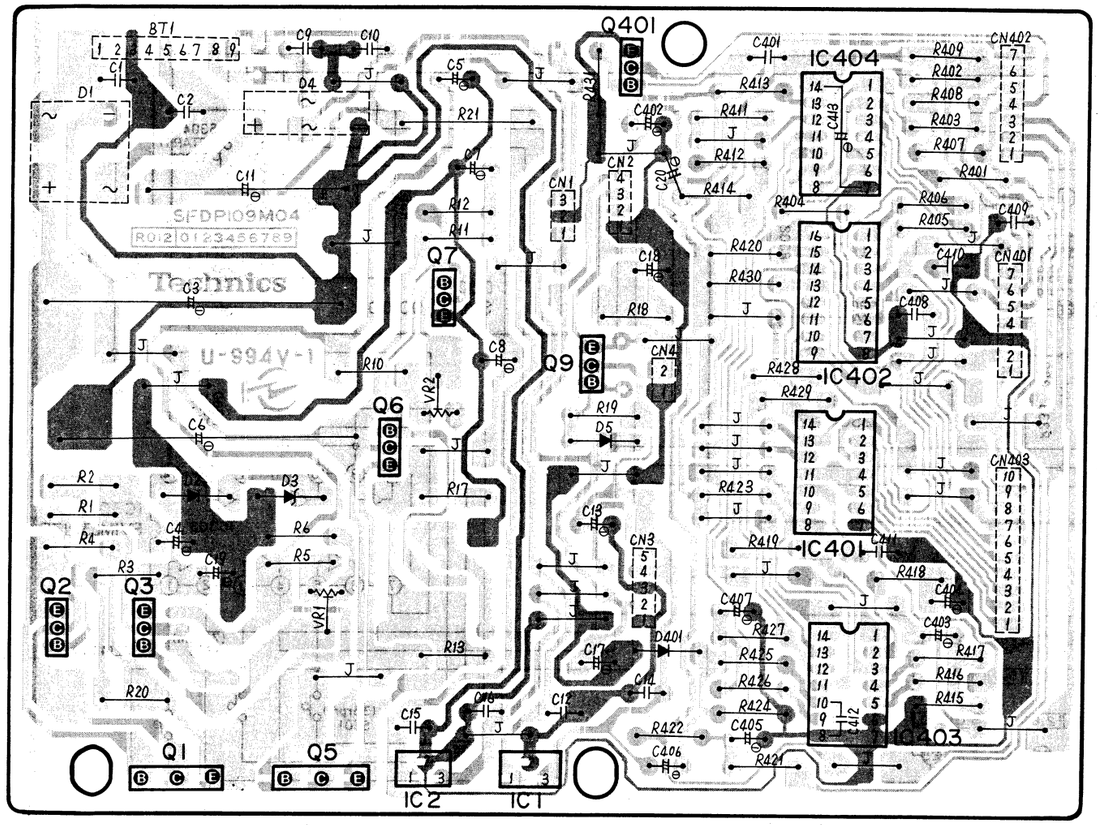
• **Driving circuit**



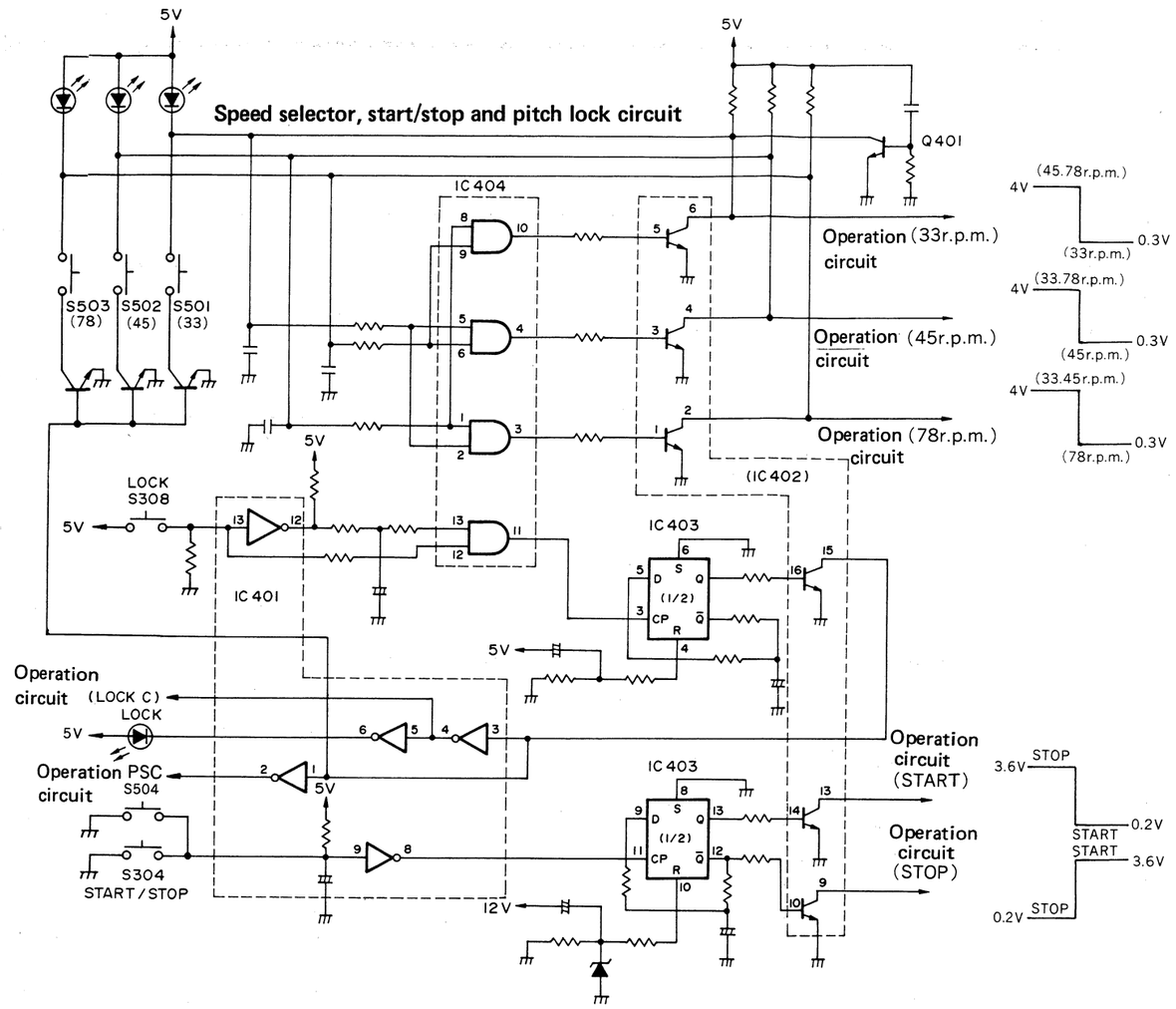
■ PRINTED CIRCUIT BOARD

Ground (Earth) lines

• Constant voltage and operation circuit



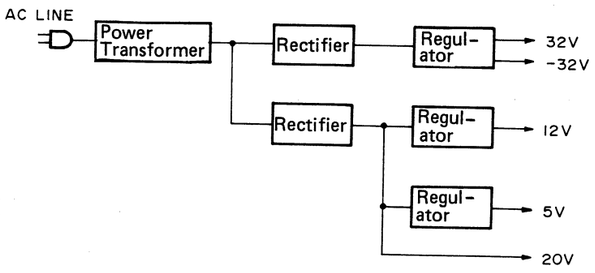
• Block diagram of constant voltage and operation circuit



• Terminal guide of IC and transistors

SVI₄₄PC7812H SVIFS78M05H	SVIM53216P MN4013B MN4081B	SVIM54515P	2SB691 2SD727
2SA885 2SC1846	2SB642 2SD636 2SD637	2SC1328	

C1



C2

• Reference voltage at each IC pin

IC404 MN4081B

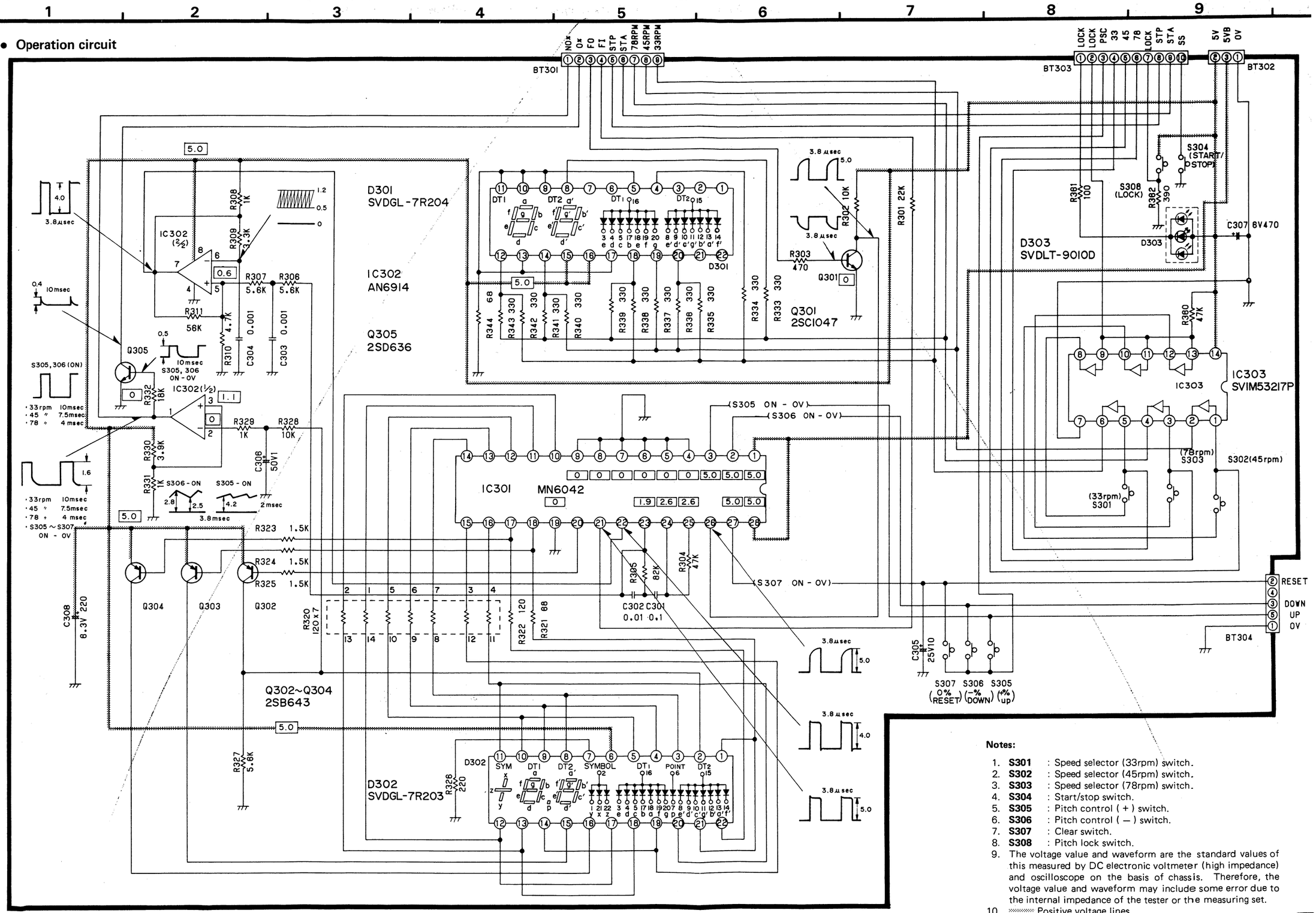
No	STOP	33rpm	45rpm	78rpm
1	4.0	4.0	0.3	4.0
2	0.3	0.3	4.0	4.0
3	0	0	0	5.0
4	0	0	5.0	0
5	0.3	0.3	4.0	4.0
6	4.0	4.0	4.0	0.3
7	0	0	0	0
8	4.0	4.0	0.3	4.0
9	4.0	4.0	4.0	0.3
10	5.0	5.0	0	0
11	0	0	0	0
12	0.1	0.1	0.1	0.1
13	5.0	5.0	5.0	5.0
14	5.0	5.0	5.0	5.0

IC402 SVIM54515P

No	STOP	33rpm	45rpm	78rpm
1	0	0	0	0.8
2	4.0	4.0	4.0	0.3
3	0	0	0.8	0
4	4.0	4.0	0.3	4.0
5	0	0.8	0	0
6	4.0	0.3	4.0	4.0
7	0	0	0	0
8	0	0	0	0
9	0.2	3.6	3.6	3.6
10	0.8	0	0	0
11	0	0	0	0
12	0	0	0	0
13	3.6	0.2	0.2	0.2
14	0	0.8	0.8	0.8
15	3.2	3.2	3.2	3.2
16	0	0	0	0

■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

• Operation circuit

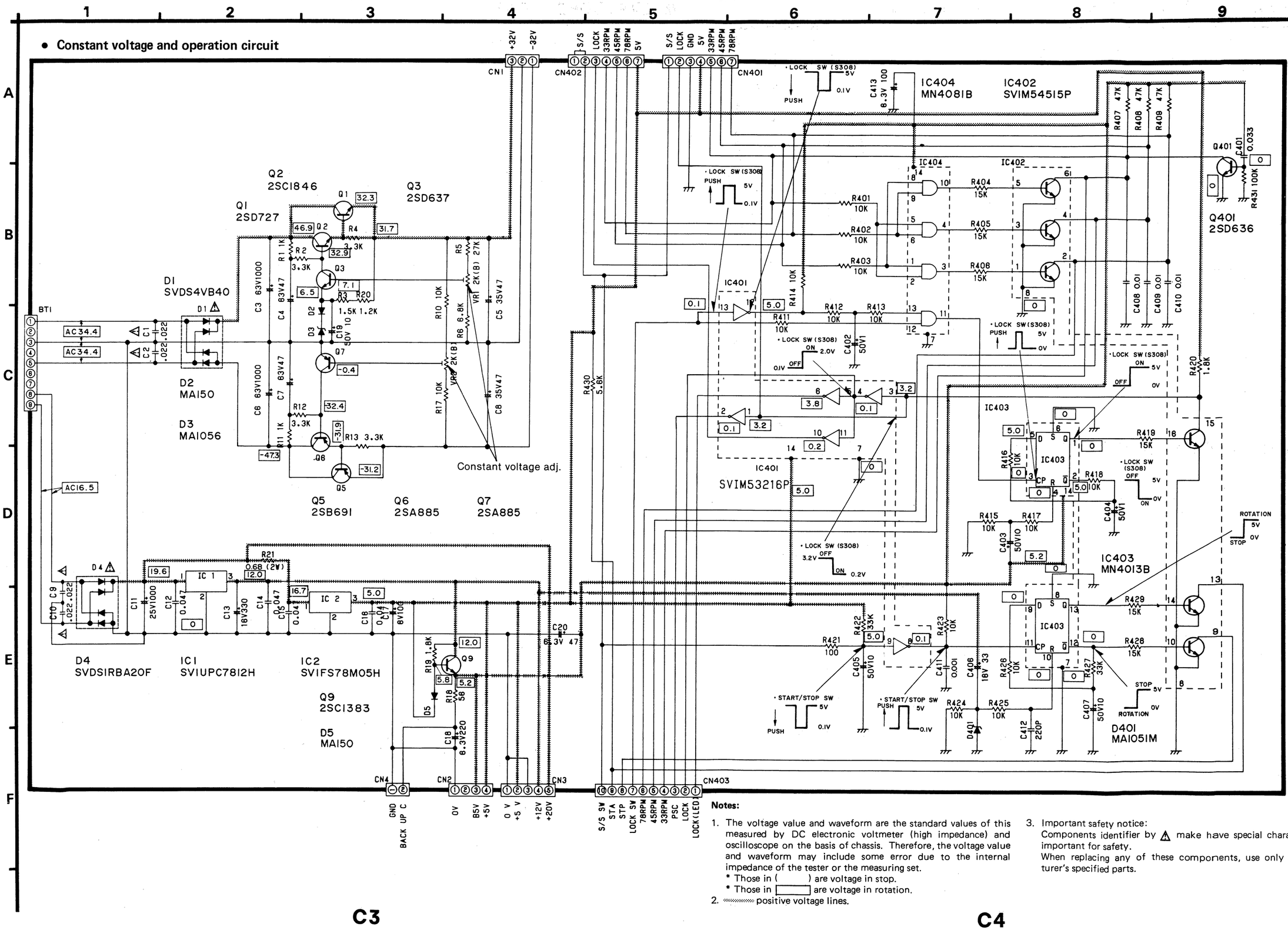


Notes:

1. **S301** : Speed selector (33rpm) switch.
2. **S302** : Speed selector (45rpm) switch.
3. **S303** : Speed selector (78rpm) switch.
4. **S304** : Start/stop switch.
5. **S305** : Pitch control (+) switch.
6. **S306** : Pitch control (—) switch.
7. **S307** : Clear switch.
8. **S308** : Pitch lock switch.
9. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
10. ▨ Positive voltage lines.

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

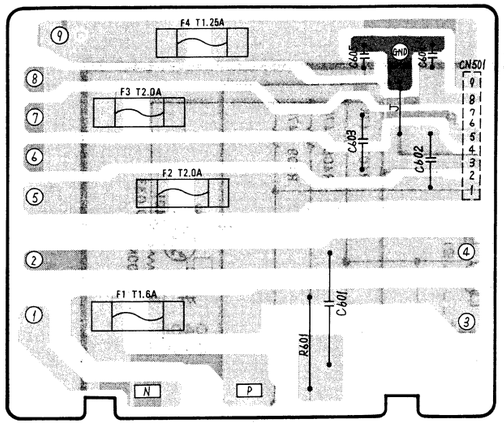


Notes:

1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
   * Those in ( ) are voltage in stop.
   * Those in [ ] are voltage in rotation.
2. ⋯⋯ positive voltage lines.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.

C3 C4

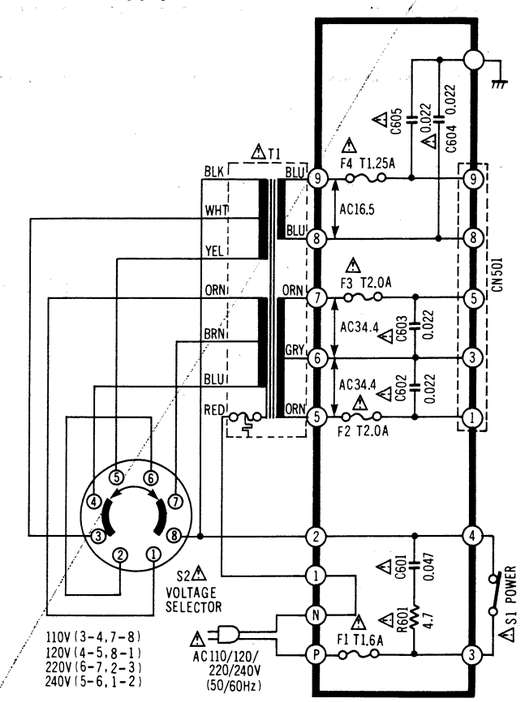
- **Power fuse** ■ **Ground (Earth) lines**



Note:

1. **S1** : Power switch in "**on**" position.
2. **S2** : Voltage selector switch in "**110V**" position.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.

- **Power supply circuit**



■ REPLACEMENT PARTS LIST...Electric Parts

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice:
   Components identified by mark have special characteristics important for safety.
   When replacing any of these components, use only, manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The "**S**" mark is service standard parts and may differ from porduction parts.

Ref. No.		Part No.	Description
INTEGRATED CIRCUITS			
IC1, 105		SVIUPC7812H	Regulator
IC2, 106		SVIFS78M05H	Regulator
IC101		AN640G	Turntable Drive
IC102		SVIM54516P	Inverter
IC103, 104, 107		AN6562	Operation Amp.
IC201, 202		DN860	Control
IC203		AN660	Control
IC204		AN6552F	FG Amplifier
IC205		SVIM53217P	Relay Drive
IC206		SVITA78L009	Regulator
IC301		MN6042	Synthesizer/Pitch Control
IC302		AN6914	Strobe Drive
IC303		SVIM53217P	Speed Selector
IC401		SVIM53216P	Inverter
IC402		SVIM54515P	Inverter
IC403		MN4013B	D Type Fili-Flop
IC404		MN4081B	2-Input AND Gate
TRANSISTORS			
Q1		2SD727	Regulator
Q2		2SC1846	Regulator
Q3		2SD637	Regulator
Q5		2SB691	Regulator
Q6		2SA885	Regulator
Q7		2SA886	Regulator
Q9	S	2SC1383Q	Regulator
Q101 ~ 103		2SB761A	Driver
Q104 ~ 106		2SD856A	Driver
Q107 ~ 109		2SC1846	Buffer
Q110 ~ 112		2SA885	Buffer

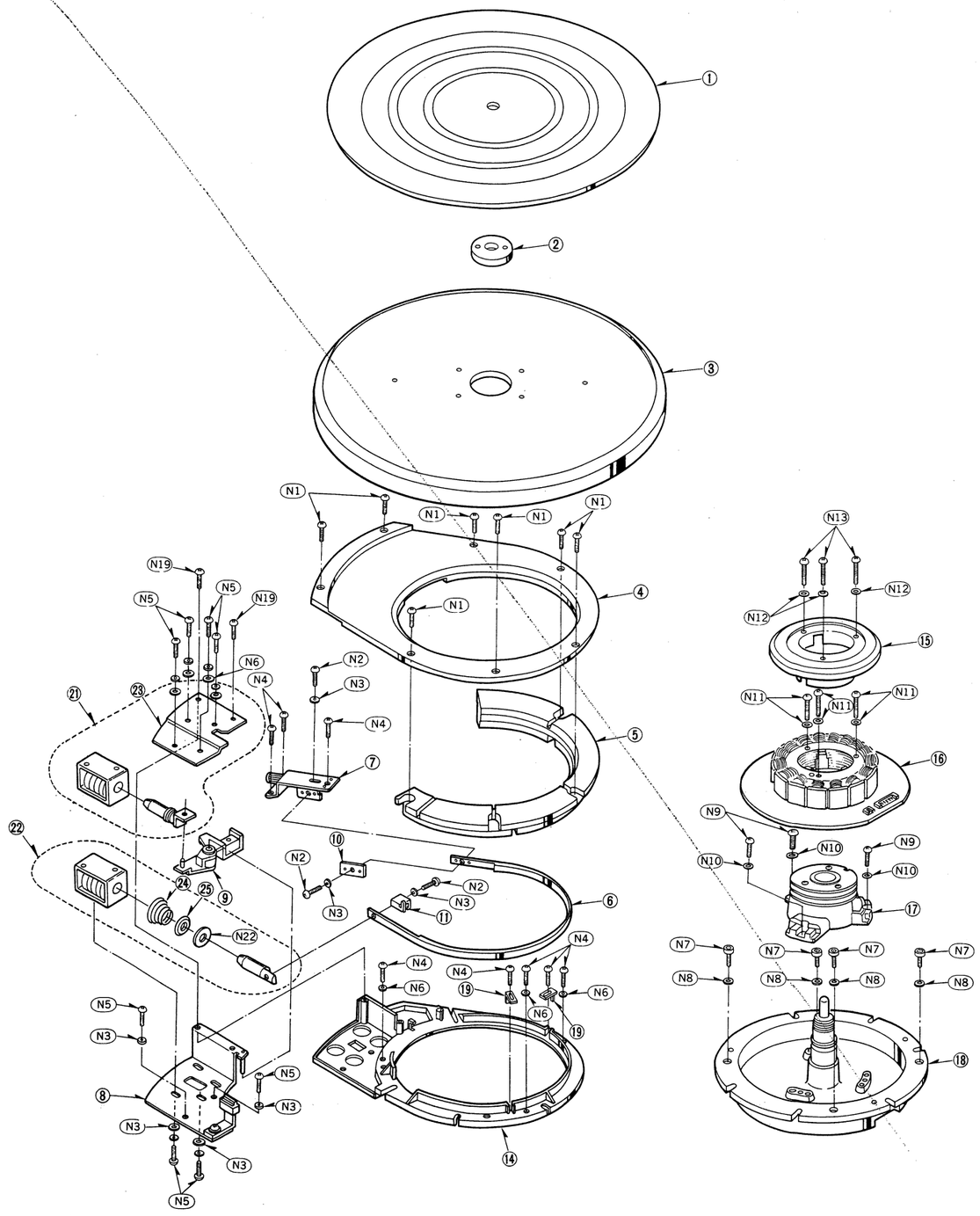
Ref. No.		Part No.	Description
Q113		2SD636	Voltage Shift
Q114		2SB641	Voltage Shift
Q115 ~ 117		2SD636	Runaway Prevent
Q118		2SB641	Runaway Prevent
Q119		2SD636	Runaway Prevent
Q201		2SC1047–D	Buffer
Q202, 204		2SD636	Strobe Drive
Q203, 205		2SD638	Strobe Drive
Q206 ~ 208		2SD636	Switching
Q251, 252		2SD636	Brake Timer
Q253, 254		2SD638	Solenoid Drive
Q255	S	2SC1383Q	Solenoid Drive
Q260		2SC1846	Regulator
Q301		2SC1047–D	Buffer
Q302 ~ 304		2SD643	Pitch Indicator Drive
Q305, 401		2SD636	Switching
Q501 ~ 503		2SD636	Speed Indicator Drive
DIODES			
D1	⚠	SVDS4VB40	Rectifier
D2, 5	S	MA162A	Rectifier
D3	S	MA1056	5.6V Zener
D4	⚠	SVDS1RBA20F	Rectifier
D101, 103, 104 201 ~ 205	S	MA162A	Rectifier
D207	S	RVDRD12FB	12V Zener
D251	S	MA162A	
D301		SVDGL–7R204	Speed Indicator
D302		SVDGL–7R203	Pitch Indicator
D303		SVDLT9010D	Pitch Lock Indicator
D401		MA1051A	5.1V Zener

Ref. No.		Part No.	Description
D501, 502		SVDRM1Z	Switching
D503 ~ 505		SVDEBR3402S	Speed Indicator
D506 ~ 510		SVDEAA5505S	Strobe Indicator
D511 ~ 515		SVDEPY5505S	Strobe Indicator
SWITCHES			
S1	⚠	ESB90619S	Power
S2	⚠	ESE37200	Voltage Selector
S301 ~ 303		EVQQJR02K	Speed Selector (Control Unit)
S304		SFDSSS01	Start/Stop (Control Unit)
S305 ~ 308		EVQQJR02K	Pitch Control
S501 ~ 503		EVQQJR02K	Speed Selector (Turntable Unit)
S504		SFDSSS01	Start/Stop (Turntable Unit)
VARIABLE RESISTORS			
VR1, 2		EVMH1GA00B23	Constant Voltage Adj., 2kΩ (B)
VR101, 102		EVMJ1GA01B23	Offset Voltage and Middle Voltage Adj., 2kΩ (B)
VR201, 206		EVMJ1GA01B24	VS Voltage and RS Current Adj., 20kΩ (B)
VR202		EVMJ1GA01B54	Brake Adj., 50kΩ (B)
VR203 ~ 205		EVMJ1GA01B14	Synchronizing Position Adj., 10kΩ (B)

Continued on page 39

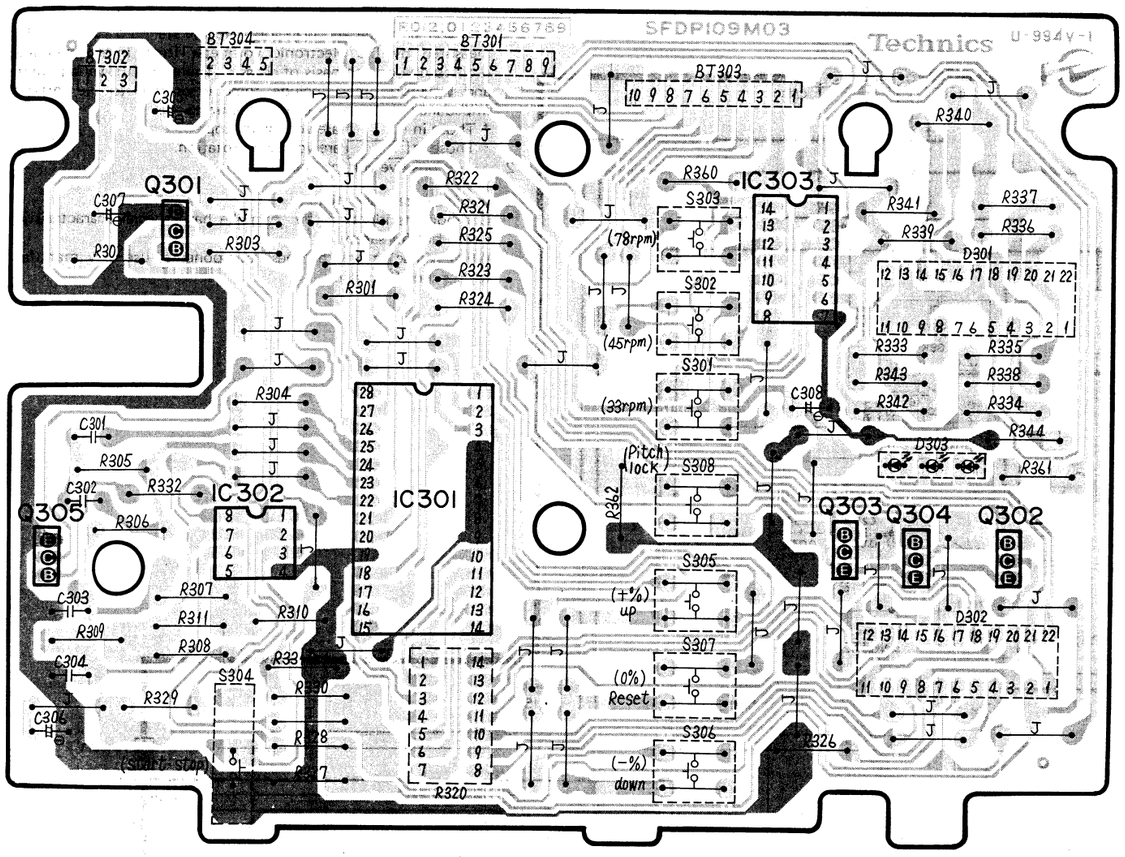
■ EXPLODED VIEWS

- **Turntable platter and motor**

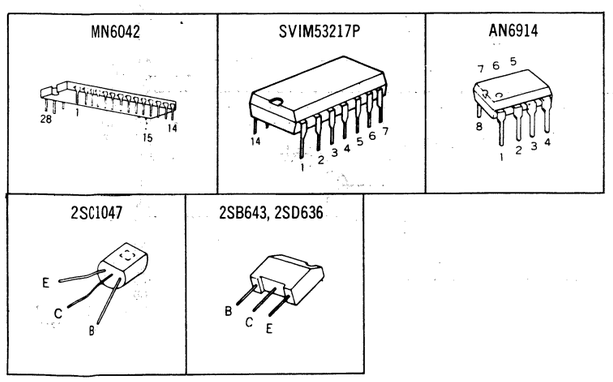


■ PRINTED CIRCUIT BOARD

- Operation circuit

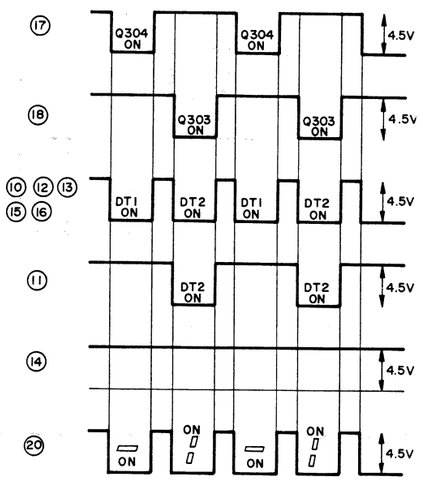


- Terminal guide of IC and transistors



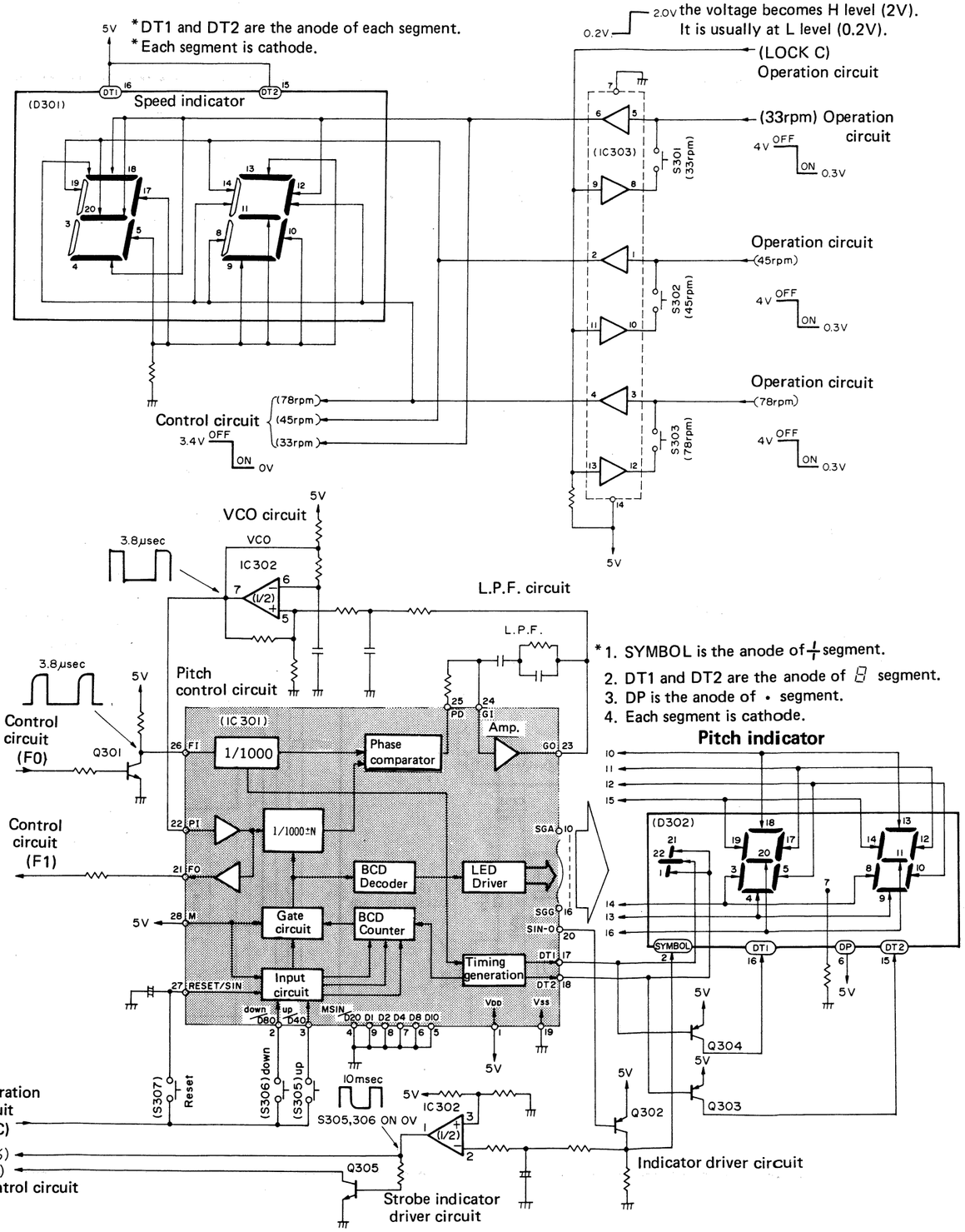
- Timing chart (When the pitch has been set to +5.9%)

IC301 pin number



C5

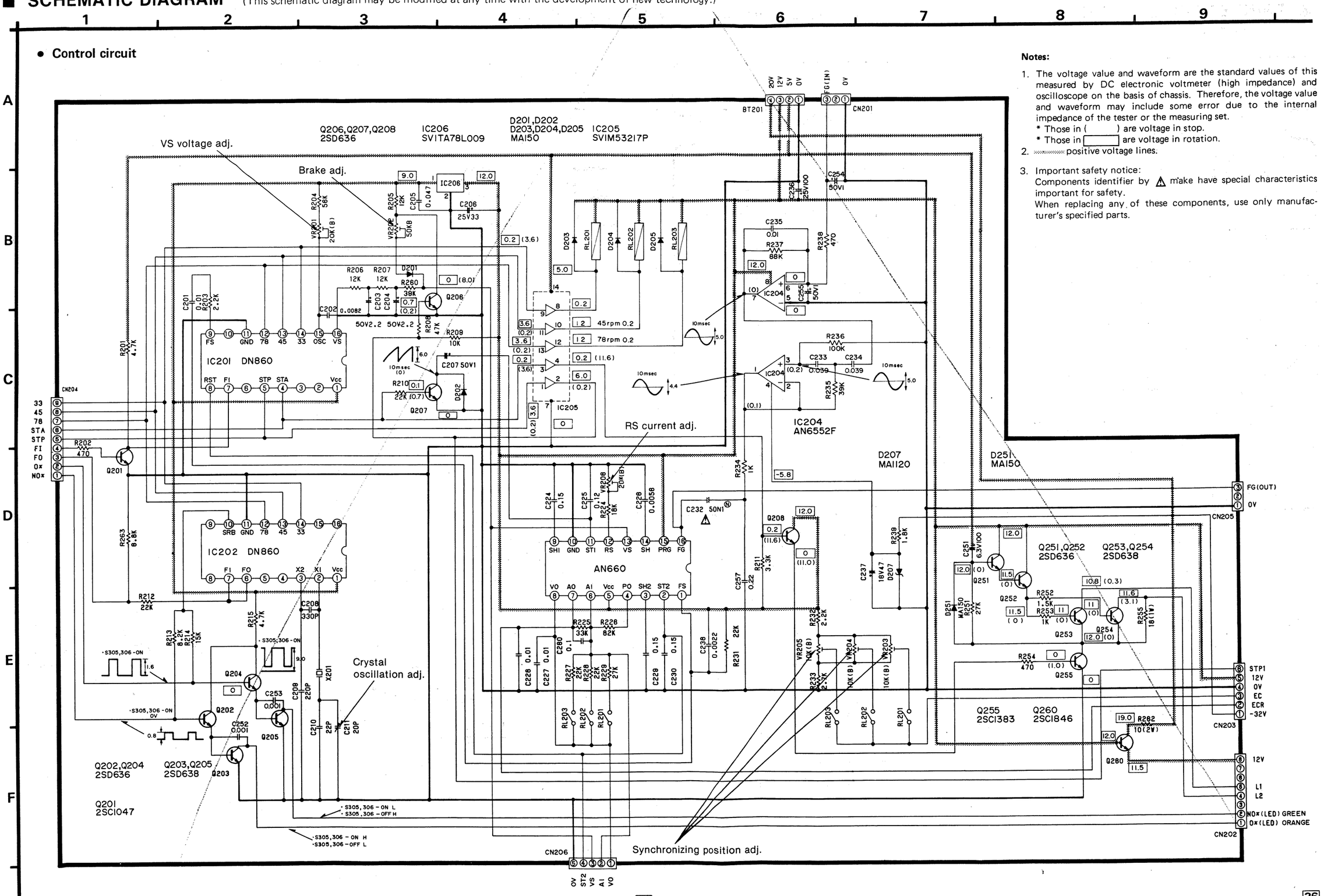
- Block diagram of operation circuit



C6

■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

• **Control circuit**

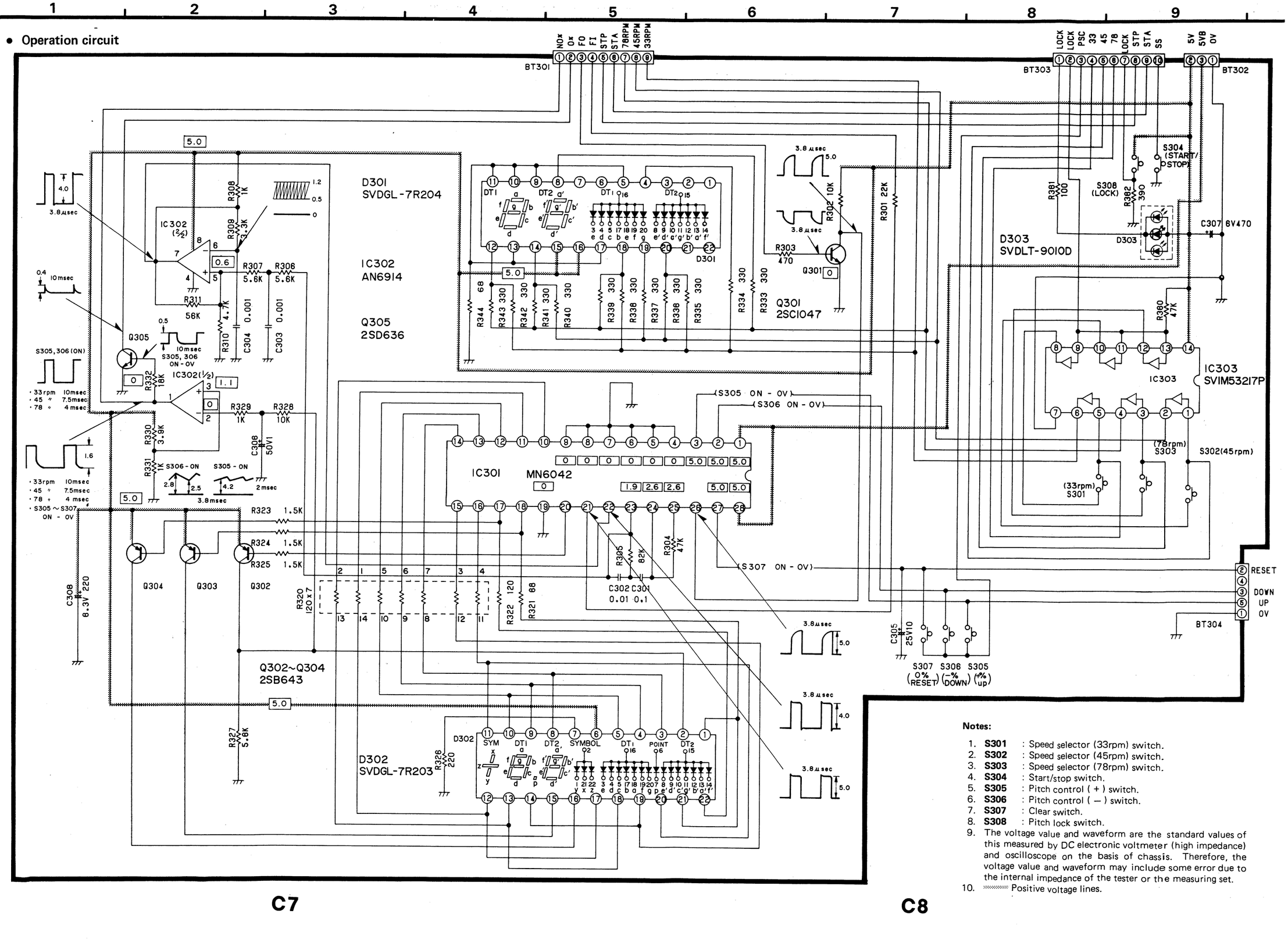


Notes:

1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
   * Those in ( ) are voltage in stop.
   * Those in [ ] are voltage in rotation.
2. ..... positive voltage lines.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.

■ SCHEMATIC DIAGRAM (This schematic diagram may be modified at any time with the development of new technology.)

• Operation circuit



Notes:

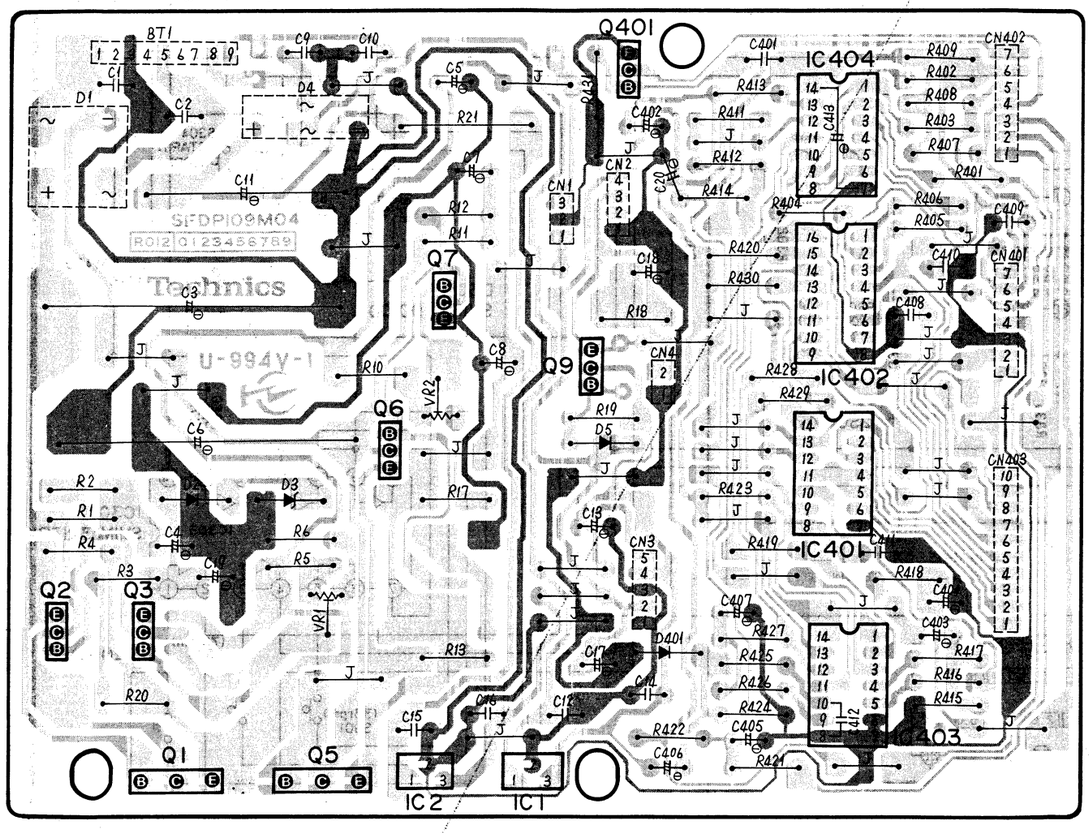
1. **S301** : Speed selector (33rpm) switch.
2. **S302** : Speed selector (45rpm) switch.
3. **S303** : Speed selector (78rpm) switch.
4. **S304** : Start/stop switch.
5. **S305** : Pitch control (+) switch.
6. **S306** : Pitch control (−) switch.
7. **S307** : Clear switch.
8. **S308** : Pitch lock switch.
9. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
10. ⋯⋯ Positive voltage lines.

C7 C8

■ PRINTED CIRCUIT BOARD

Ground (Earth) lines

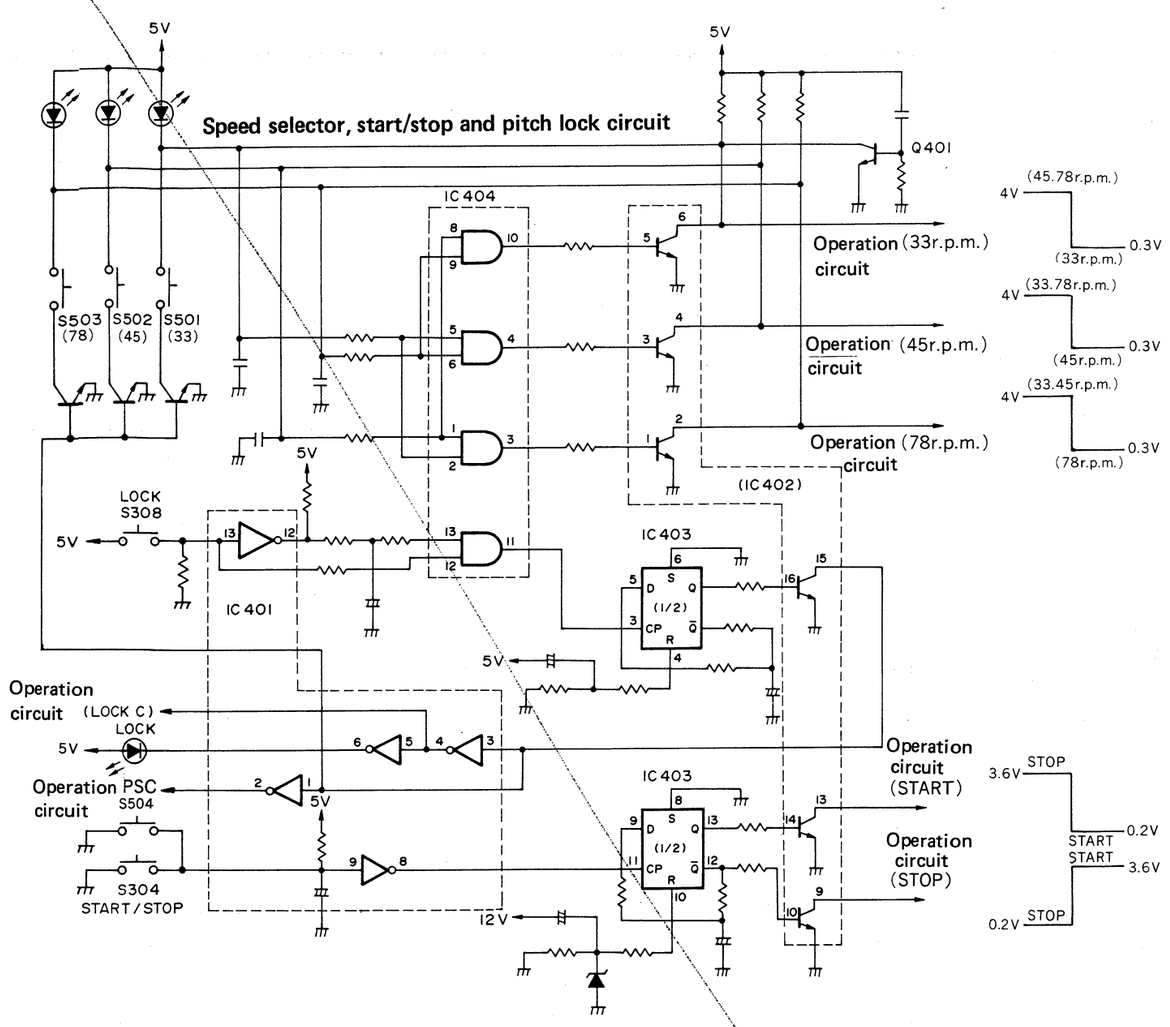
• Constant voltage and operation circuit

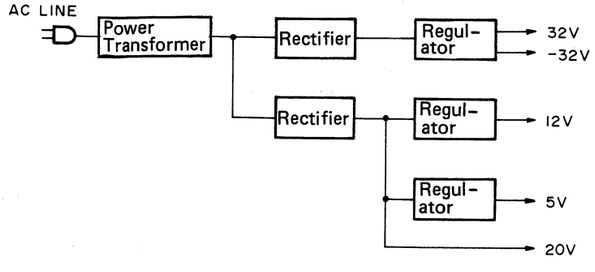


• Terminal guide of IC and transistors

SVIμPC7812H SVIFS78M05H	SVIM53216P MN4013B MN4081B	SVIM54515P	2SB691 2SD727
2SA885 2SC1846	2SB642 2SD636 2SD637	2SC1328	

• Block diagram of constant voltage and operation circuit





• Reference voltage at each IC pin

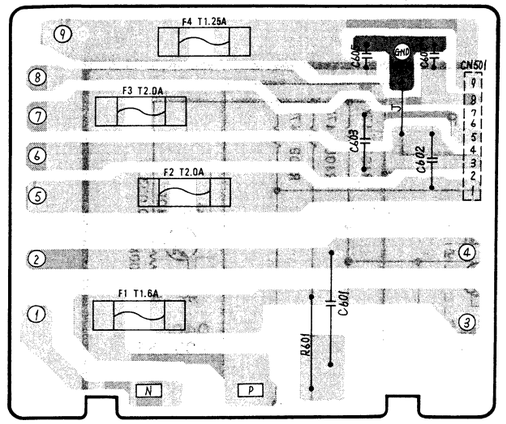
IC404 MN4081B

No	STOP	33rpm	45rpm	78rpm
1	4.0	4.0	0.3	4.0
2	0.3	0.3	4.0	4.0
3	0	0	0	5.0
4	0	0	5.0	0
5	0.3	0.3	4.0	4.0
6	4.0	4.0	4.0	0.3
7	0	0	0	0
8	4.0	4.0	0.3	4.0
9	4.0	4.0	4.0	0.3
10	5.0	5.0	0	0
11	0	0	0	0
12	0.1	0.1	0.1	0.1
13	5.0	5.0	5.0	5.0
14	5.0	5.0	5.0	5.0

IC402 SVIM54515P

No	STOP	33rpm	45rpm	78rpm
1	0	0	0	0.8
2	4.0	4.0	4.0	0.3
3	0	0	0.8	0
4	4.0	4.0	0.3	4.0
5	0	0.8	0	0
6	4.0	0.3	4.0	4.0
7	0	0	0	0
8	0	0	0	0
9	0.2	3.6	3.6	3.6
10	0.8	0	0	0
11	0	0	0	0
12	0	0	0	0
13	3.6	0.2	0.2	0.2
14	0	0.8	0.8	0.8
15	3.2	3.2	3.2	3.2
16	0	0	0	0

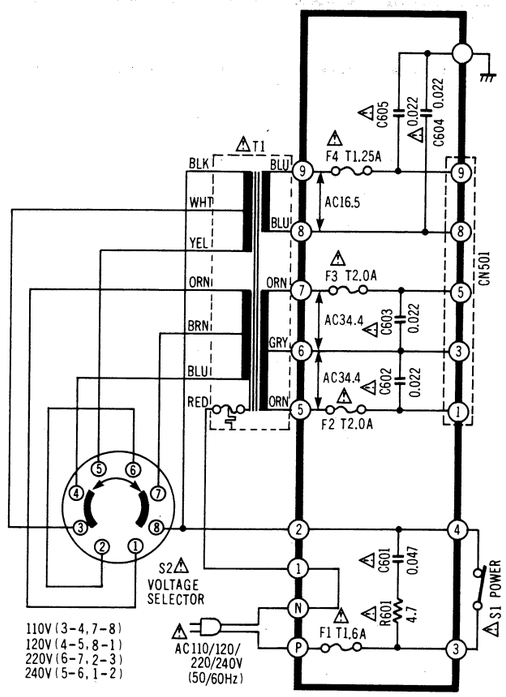
● Power fuse ■ Ground (Earth) lines



Note:

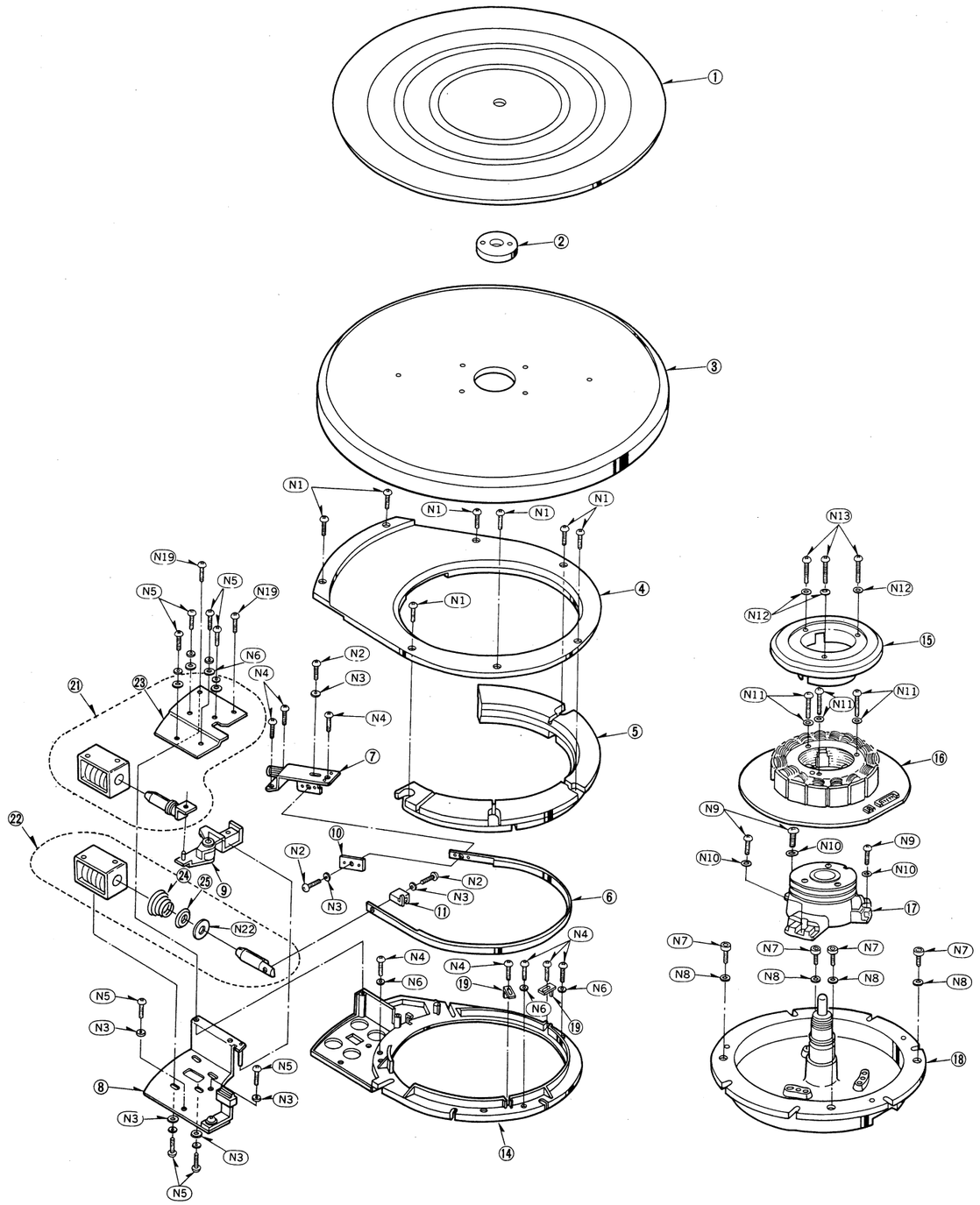
1. **S1** : Power switch in "**on**" position.
2. **S2** : Voltage selector switch in "**110V**" position.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.

● Power supply circuit



■ EXPLODED VIEWS

● Turntable platter and motor



■ REPLACEMENT PARTS LIST...Electric Parts

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only, manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The "**S**" mark is service standard parts and may differ from porduction parts.

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC1, 105	SVIUPC7812H	Regulator
IC2, 106	SVIFS78M05H	Regulator
IC101	AN640G	Turntable Drive
IC102	SVIM54516P	Inverter
IC103, 104, 107	AN6562	Operation Amp.
IC201, 202	DN860	Control
IC203	AN660	Control
IC204	AN6552F	FG Amplifier
IC205	SVIM53217P	Relay Drive
IC206	SVITA78L009	Regulator
IC301	MN6042	Synthesizer/Pitch Control
IC302	AN6914	Strobe Drive
IC303	SVIM53217P	Speed Selector
IC401	SVIM53216P	Inverter
IC402	SVIM54515P	Inverter
IC403	MN4013B	D-Type Fili-Flop
IC404	MN4081B	2-Input AND Gate
TRANSISTORS		
Q1	2SD727	Regulator
Q2	2SC1846	Regulator
Q3	2SD637	Regulator
Q5	2SB691	Regulator
Q6	2SA885	Regulator
Q7	2SA886	Regulator
Q9 S	2SC1383Q	Regulator
Q101 ~ 103	2SB761A	Driver
Q104 ~ 106	2SD856A	Driver
Q107 ~ 109	2SC1846	Buffer
Q110 ~ 112	2SA885	Buffer

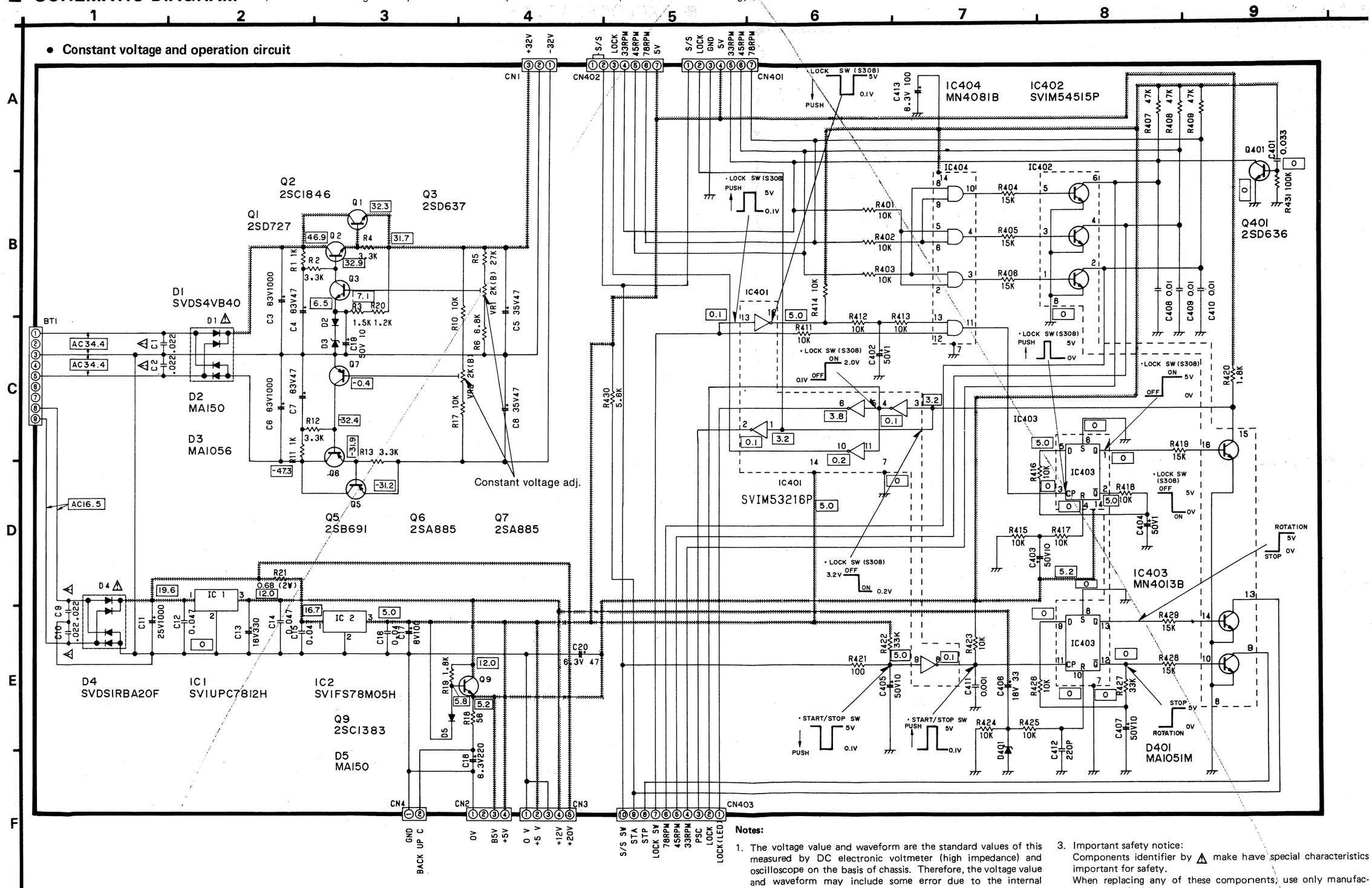
Ref. No.	Part No.	Description
Q113	2SD636	Voltage Shift
Q114	2SB641	Voltage Shift
Q115 ~ 117	2SD636	Runaway Prevent
Q118	2SB641	Runaway Prevent
Q119	2SD636	Runaway Prevent
Q201	2SC1047-D	Buffer
Q202, 204	2SD636	Strobe Drive
Q203, 205	2SD638	Strobe Drive
Q206 ~ 208	2SD636	Switching
Q251, 252	2SD636	Brake Timer
Q253, 254	2SD638	Solenoid Drive
Q255 S	2SC1383Q	Solenoid Drive
Q260	2SC1846	Regulator
Q301	2SC1047-D	Buffer
Q302 ~ 304	2SD643	Pitch Indicator Drive
Q305, 401	2SD636	Switching
Q501 ~ 503	2SD636	Speed Indicator Drive
DIODES		
D1 ⚠	SVDS4VB40	Rectifier
D2, 5 S	MA162A	Rectifier
D3 S	MA1056	5.6V Zener
D4 ⚠	SVDS1RBA20F	Rectifier
D101, 103, 104 S 201 ~ 205	MA162A	Rectifier
D207 S	RVDRD12FB	12V Zener
D251 S	MA162A	
D301	SVDGL-7R204	Speed Indicator
D302	SVDGL-7R203	Pitch Indicator
D303	SVDLT9010D	Pitch Lock Indicator
D401	MA1051A	5.1V Zener

Ref. No.	Part No.	Description
D501, 502	SVDRM1Z	Switching
D503 ~ 505	SVDEBR3402S	Speed Indicator
D506 ~ 510	SVDEAA5505S	Strobe Indicator
D511 ~ 515	SVDEPY5505S	Strobe Indicator
SWITCHES		
S1 ⚠	ESB90619S	Power
S2 ⚠	ESE37200	Voltage Selector
S301 ~ 303	EVQQJR02K	Speed Selector (Control Unit)
S304	SFDSSS01	Start/Stop (Control Unit)
S305 ~ 308	EVQQJR02K	Pitch Control
S501 ~ 503	EVQQJR02K	Speed Selector (Turntable Unit)
S504	SFDSSS01	Start/Stop (Turntable Unit)
VARIABLE RESISTORS		
VR1, 2	EVMH1GA00B23	Constant Voltage Adj., 2kΩ (B)
VR101, 102	EVMJ1GA01B23	Offset Voltage and Middle Voltage Adj., 2kΩ (B)
VR201, 206	EVMJ1GA01B24	VS Voltage and RS Current Adj. 20kΩ (B)
VR202	EVMJ1GA01B54	Brake Adj., 50kΩ (B)
VR203 ~ 205	EVMJ1GA01B14	Synchronizing Position Adj., 10kΩ (B)

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

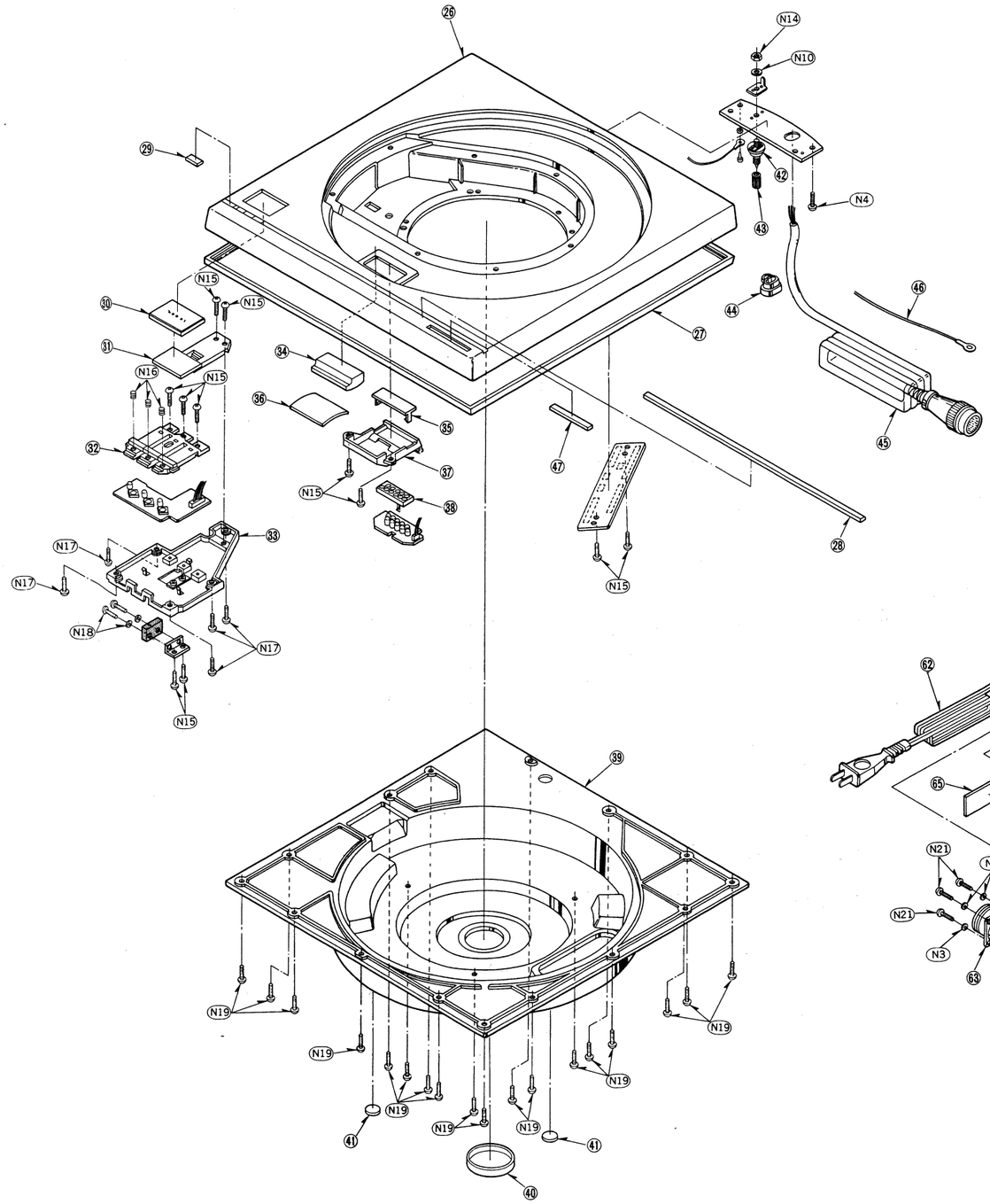
• **Constant voltage and operation circuit**



Notes:

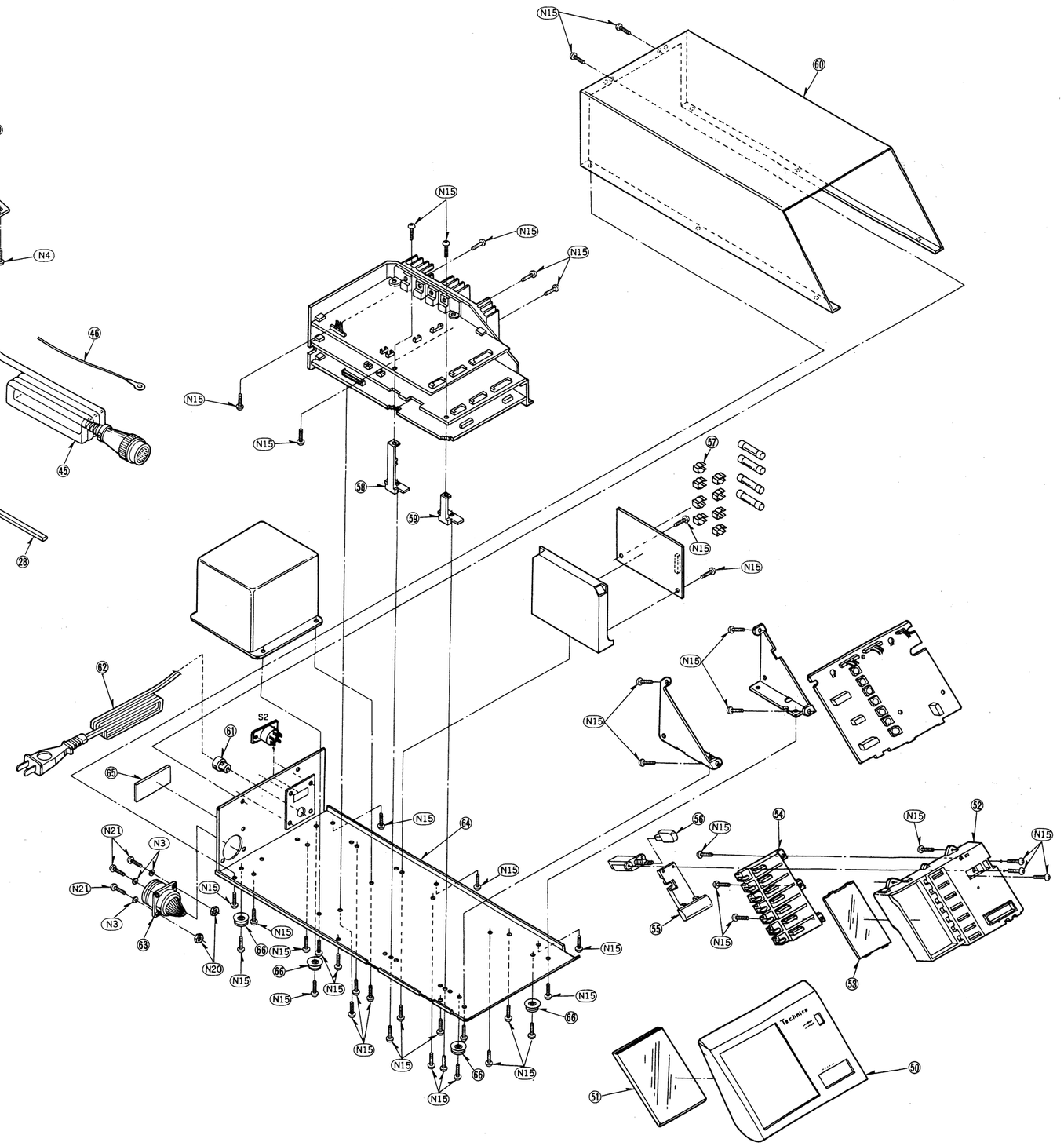
1. The voltage value and waveform are the standard values of this measured by DC electronic voltmeter (high impedance) and oscilloscope on the basis of chassis. Therefore, the voltage value and waveform may include some error due to the internal impedance of the tester or the measuring set.
   * Those in ( ) are voltage in stop.
   * Those in [ ] are voltage in rotation.
2. ⟿ positive voltage lines.
3. Important safety notice:
   Components identifier by ⚠ make have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.

- Cabinet



C11

- Control unit



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Continued from page 35

Ref. No.	Part No.	Description
FUSES		
F1 ⚠	XBA2C16TR0	T 1.6A
F2 ⚠	XBA2C12TR0	T 1.25A
F3, 4 ⚠	XBA2C20TR0	T 2.0A
COMPONENT COMBINATION		
R320	EXBRB7121M	120Ω x 7

Ref. No.	Part No.	Description
CRYSTAL		
X201	SVQU306115	4.19328 MHz
RELAY		
RL201 ~ 203	SFDYC10–01	
THYRISTOR		
SCR101	SVTTT201–110	

Ref. No.	Part No.	Description
VARIABLE CAPACITOR		
C211	ECV1ZW20X53N	
POWER TRANSFORMER		
T1 ⚠	SLT85HE14E	Power Source

■ REPLACEMENT PARTS LIST...Cabinet and Chassis Parts

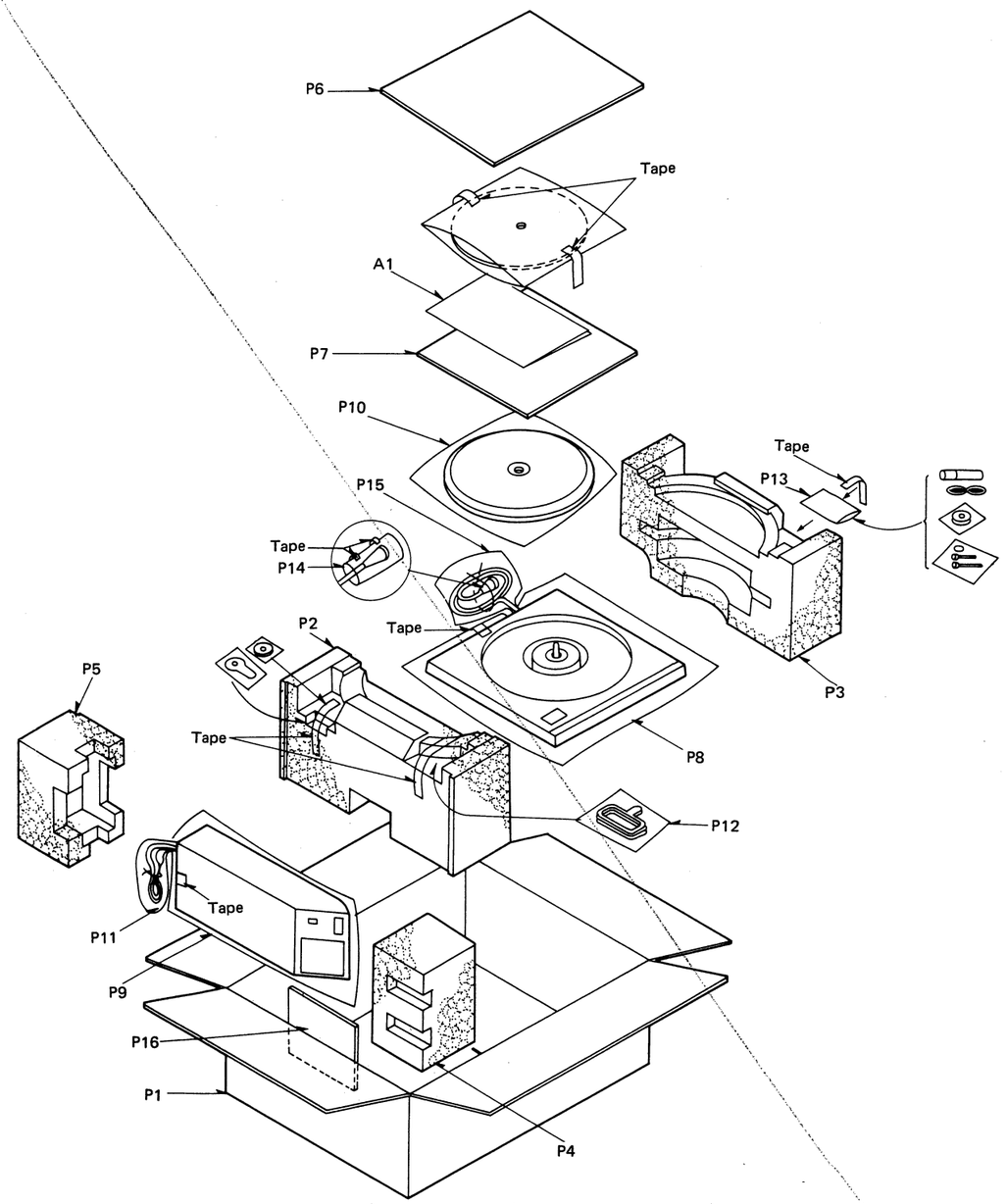
Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only, manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The " **S** " mark is service standard parts and may differ from porduction parts.
5. The parenthexized numbers in the columns of description stand for the quantity per set.

Ref. No.		Part No.	Descriptions	
CABINET and CHASSIS PARTS				
• **Turntable and Motor Section**				
1		SFTG172–01	Turntable Mat	(1)
2		SFTB109N01	Ring, Turntable Supporter	(1)
3		SFTE109N01A	Turntable	(1)
4		SFUM109N06	Cover, Cabinet Panel	(1)
5		SFGH109N01	Cushion Rubber, Cabinet Panel	(1)
6		SFUP109N05E	Brake Belt Ass'y	(1)
7		SFUP109N06E	Rack, Support	(1)
8		SFUP109N03E	Plate, Solenoid	(1)
9		SFUM109N13E	Lever Ass'y, Brake	(1)
10		SFUP109N08	Bracket, Brake Belt	(1)
11		SFUP109N16	Plate, Brake Belt	(1)
14		SFUM109N12	Case, Brake Belt	(1)
15		SFMG109N06	Cover, Stater Coil	(1)
16		SFDP109M11A	Motor Coil Ass'y	(1)
17		SFMG109N01A	FG Base Ass'y	(1)
18		SFMZ109N02A	Turntable Shaft Ass'y	(1)
19		SFUP109N15	Plate, Belt Control	(1)
21		SFDZ109N02E	Solenoid Ass'y	(1)
22		SFDZ109N03E	Solenoid Ass'y	(1)
23		SFUP109N19	Plate, Solenoid Ass'y	(1)
24		SFQA109N02	Spring, Solenoid	(1)
25		SFGH109N03	Rubber, Solenoid	(1)
• **Main Cabinet Section**				
26		SFAC109N02E	Cabinet	(1)
27		SFGH109N02	Spacer, Cabinet	(1)
28		SFUM109N01	Ornament Plate	(1)
29		SFUM109N02	Ornament Plate	(1)
30		SFKT109N01	Ornament, Start, Stop Button	(1)
31		SFUM109N08E	Button, Start, Stop	(1)
32		SFUM109N09E	Button, Speed Selector	(1)
33		SFUM109N07	Guide, Start, Stop Button	(1)
34		SFUM109N03	Cover, Strobe	(1)
35		SFUZ109N02	Filter, Strobe	(1)
36		SFUZ109N01	Spacer, Strobe Case	(1)
37		SFUM109N04	Case, Strobe	(1)
38		SFUM109N05	Spacer, Strobe	(1)
39		SFAU109N01	Cover, Bottom	(1)
40		SFGZ109N01	Cap, Bottom Cover	(1)
41		SFUZ109N08	Felt, Bottom Cover	(1)
42		SNE271S	Terminal, Ground	(1)
43		SNE273–1	Knob, Ground Terminal	(1)
44		SFSR7P–2	Bushing, DC Cord	(1)
45		SFEZ109N01A	DC Cord	(1)
46		SFEL109N04E	Ground Wire	(1)
47		SFKB109N01	Bage, Technics	(1)

Ref. No.		Part No.	Description	
• **Control Unit Section**				
50		SFAC109N03	Panel, Front	(1)
51		SFUM109N17	Glass, Front Panel	(1)
52		SFUM109N16	Frame, Control Section	(1)
53		SFUM109N18	Filter, Control Section	(1)
54		SFUM109N19E	Button, Control	(1)
55		SFUM109N20E	Button, Start, Stop	(1)
56		SFKT109N05	Button, Power Switch	(1)
57		SJT347	Terminal, Fuse	(8)
58		SFUM109N21	Shaft, Support	(2)
59		SFUM109N22	Shaft, Support	(2)
60		SFUP10914E	Cabinet	(1)
61 [EK] ⚠		SJA139	AC Cord	(1)
61 [XL] ⚠		SJAG23	AC Cord	(1)
61 [Other Areas] ⚠		SJA137	AC Cord	(1)
62 [EK]		SFSR5N–4	Bushing, AC Cord	(1)
62 [Other Areas]		SFSR4N–4	Bushing, AC Cord	(1)
63		SFDJ109N04E	Socket, (24P)	(1)
64		SFUP109N01	Bottom Cover	(1)
65 [E, EC]		SFNN109S01	Neme Plate	(1)
65 [EK,XL]		SFNN109G01	Name Plate	(1)
65 [XA, XM]		SFNN109X01	Name Plate	(1)
65 [Other Areas]		SFNN109R01	Name Plate	(1)
66		SKL261	Foot, Set	(6)
SCREWS, WASHERS AND NUTS				
N1	**S**	XTN3+10BFZ	Screw, ⊕ 3 x 10	(5)
N2	**S**	XSN3+6S	Screw, ⊕ 3 x 6	(2)
N3	**S**	XWA3B	Washer, φ3	(6)
N4	**S**	XTV3+8BFN	Screw, ⊕ 3 x 8	(9)
N5	**S**	XSN3+5S	Screw, ⊕ 3 x 5	(8)
N6	**S**	XWE3	Washer, φ3	(7)
N7		XVE4A12FN	Screw, ⊕ 4 x 12	(4)
N8	**S**	XWA4B	Washer, φ4	(4)
N9	**S**	XSN4+10S	Screw, ⊕ 4 x 10	(3)
N10	**S**	XWA4B	Washer, φ4	(3)
N11		XYN3+C40S	Screw, ⊕ 3 x 40	(3)
N12		SFX0109N01	Washer, φ3	(3)
N13		XSB3+35FZS	Screw, ⊕ 3 x 35	(3)
N14	**S**	XNG4ES	Nut, φ4	(1)
N15	**S**	XTV3+8BFZ	Screw, ⊕ 3 x 8	(39)
N16		XXE26D5FP	Screw	(3)
N17	**S**	XTN3+8BFZ	Screw, ⊕ 3 x 8	(5)
N18		XYN23+C10	Screw, ⊕ 2.3 x 10	(2)
N19		XTW3+10TFZ	Screw, ⊕ 3 x 10	(20)
N20	**S**	XNG3ES	Nut, φ3	(4)
N21		XSN3+8S	Screw, ⊕ 3 x 8	(4)

Ref. No.		Part No.	Description	
ACCESSORIES				
A1		SFNU109S01	Instructions Book	(1)
A2		SFNZ109M04	Caution Book	(1)
A3		SFW0010	Oil Kit	(1)
A4		SFWE010	Adaptor, 45 r.p.m.	(1)
A5		SFEL028–01E	Ground Wire	(1)
A6		SFXW650–2	Washer	(5)
A7		XSN5+60FZS	Screw	(5)
A8		XSN5+43FZS	Screw	(5)
A9		SFWZ109N01E	Handle, Turntable	(2)
A10		SFWZ109N02	Spanner, Turntable	(1)
A11 [XA] only ⚠		SFDKI19118	2P Plug	(1)
A12		SFWK109N01	Cloth, Cleaner	(1)
A13		SFNZ109M01	Mounting Map	(1)
A14		SFWZ109N03	Cleaner, Turntable	(1)
A15		SFHP109N02	Case, Cleaner	(1)
A16		SFNZ109N05	Label, Cleaner	(2)
PACKING PARTS				
P1 [EF]		SFHP109C01	Carton Box	(1)
P1 [Other Areas]		SFHP109M01	Carton Box	(1)
P2		SFHH109N01	Pad, Left Turntable	(1)
P3		SFHH109N02	Pad, Right Turntable	(1)
P4		SFHH109N03	Pad, Front Control Unit	(1)
P5		SFHH109N04	Pad, Rear Control Unit	(1)
P6		SFHD109N01	Pad, Top	(1)
P7		SFHD109N02	Pad, Turntable	(1)
P8		SFYF60A60	Polyethylene Bag, Turntable	(1)
P9		SFYF28A55	Polyethylene Bag, Control Unit	(1)
P10		SFYF45C50	Polyethylene Bag,	(1)
P11		SFYF10A30	Polyethylene Bag, AC Cord	(1)
P12		SFYF12A15	Polyethylene Bag, T–T Handle	(1)
P13		SFYF09A15	Polyethylene Bag Screws	(1)
P14		SFHZ109N01	Sheet, DC Cord	(1)
P15		SFYF17A25	Polyethylene Bag, DC Cord	(1)
P16		SFHD109N03	Pad, Side Control Unit	(1)
P17		SFHZ109N03	Anti-Rust Paper	(1)

■ PACKINGS



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Continued from page 35

Ref. No.	Part No.	Description
FUSES		
F1 ⚠	XBA2C16TR0	T 1.6A
F2 ⚠	XBA2C12TR0	T 1.25A
F3, 4 ⚠	XBA2C20TR0	T 2.0A
COMPONENT COMBINATION		
R320	EXBRB7121M	120Ω x 7

Ref. No.	Part No.	Description
CRYSTAL		
X201	SVQU306115	4.19328 MHz
RELAY		
RL201 ~ 203	SFDYC10–01	
THYRISTOR		
SCR101	SVTTT201–110	

Ref. No.	Part No.	Description
VARIABLE CAPACITOR		
C211	ECV1ZW20X53N	
POWER TRANSFORMER		
T1 ⚠	SLT85HE14E	Power Source

■ REPLACEMENT PARTS LIST...Cabinet and Chassis Parts

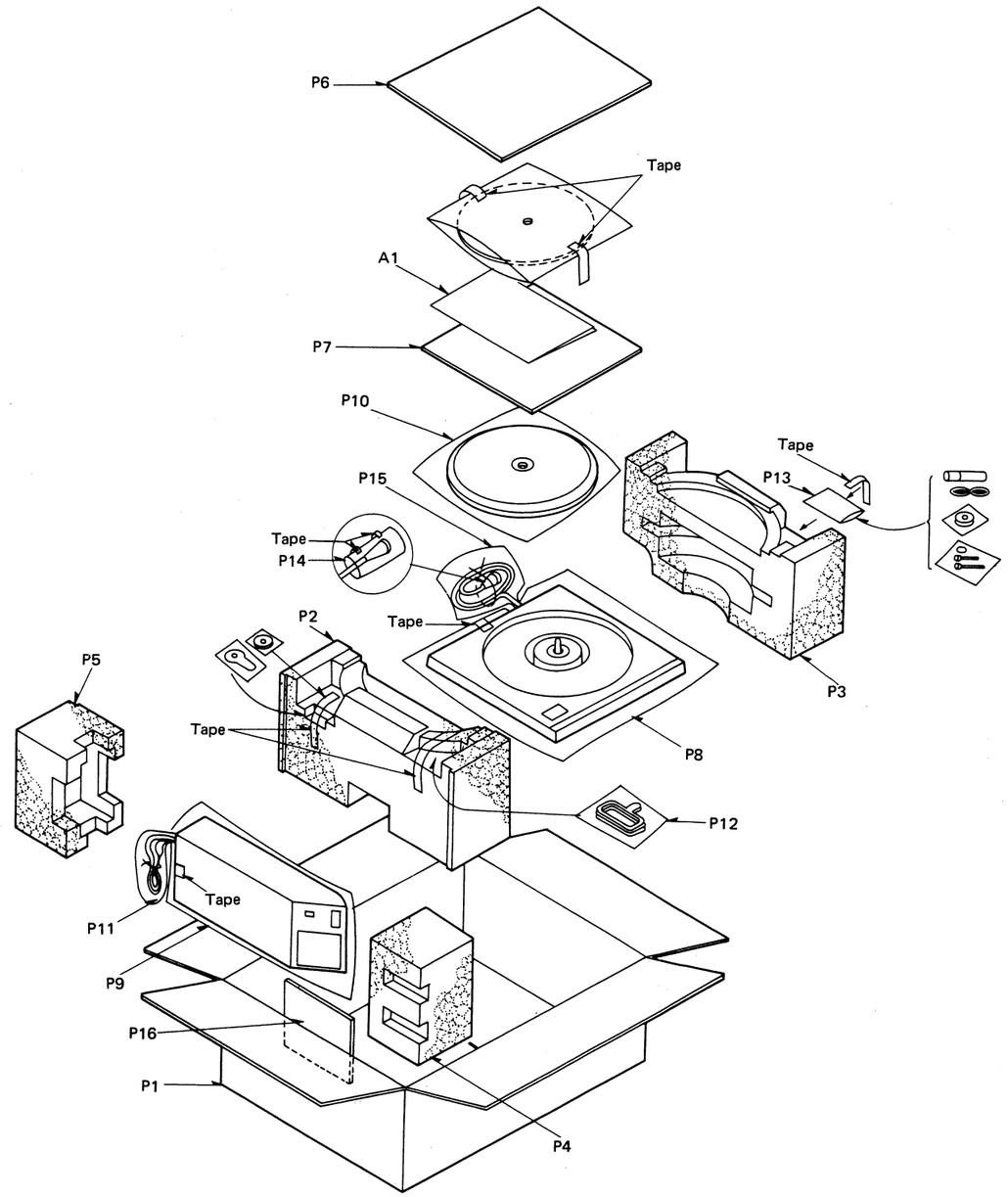
Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only, manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The "**S**" mark is service standard parts and may differ from porduction parts.
5. The parenthexized numbers in the columns of description stand for the quantity per set.

Ref. No.		Part No.	Descriptions	
CABINET and CHASSIS PARTS				
• **Turntable and Motor Section**				
1		SFTG172–01	Turntable Mat	(1)
2		SFTB109N01	Ring, Turntable Supporter	(1)
3		SFTE109N01A	Turntable	(1)
4		SFUM109N06	Cover, Cabinet Panel	(1)
5		SFGH109N01	Cushion Rubber, Cabinet Panel	(1)
6		SFUP109N05E	Brake Belt Ass'y	(1)
7		SFUP109N06E	Rack, Support	(1)
8		SFUP109N03E	Plate, Solenoid	(1)
9		SFUM109N13E	Lever Ass'y, Brake	(1)
10		SFUP109N08	Bracket, Brake Belt	(1)
11		SFUP109N16	Plate, Brake Belt	(1)
14		SFUM109N12	Case, Brake Belt	(1)
15		SFMG109N06	Cover, Stater Coil	(1)
16		SFDP109M11A	Motor Coil Ass'y	(1)
17		SFMG109N01A	FG Base Ass'y	(1)
18		SFMZ109N02A	Turntable Shaft Ass'y	(1)
19		SFUP109N15	Plate, Belt Control	(1)
21		SFDZ109N02E	Solenoid Ass'y	(1)
22		SFDZ109N03E	Solenoid Ass'y	(1)
23		SFUP109N19	Plate, Solenoid Ass'y	(1)
24		SFQA109N02	Spring, Solenoid	(1)
25		SFGH109N03	Rubber, Solenoid	(1)
• **Main Cabinet Section**				
26		SFAC109N02E	Cabinet	(1)
27		SFGH109N02	Spacer, Cabinet	(1)
28		SFUM109N01	Ornament Plate	(1)
29		SFUM109N02	Ornament Plate	(1)
30		SFKT109N01	Ornament, Start, Stop Button	(1)
31		SFUM109N08E	Button, Start, Stop	(1)
32		SFUM109N09E	Button, Speed Selector	(1)
33		SFUM109N07	Guide, Start, Stop Button	(1)
34		SFUM109N03	Cover, Strobe	(1)
35		SFUZ109N02	Filter, Strobe	(1)
36		SFUZ109N01	Spacer, Strobe Case	(1)
37		SFUM109N04	Case, Strobe	(1)
38		SFUM109N05	Spacer, Strobe	(1)
39		SFAU109N01	Cover, Bottom	(1)
40		SFGZ109N01	Cap, Bottom Cover	(1)
41		SFUZ109N08	Felt, Bottom Cover	(1)
42		SNE271S	Terminal, Ground	(1)
43		SNE273–1	Knob, Ground Terminal	(1)
44		SFSR7P–2	Bushing, DC Cord	(1)
45		SFEZ109N01A	DC Cord	(1)
46		SFEL109N04E	Ground Wire	(1)
47		SFKB109N01	Bage, Technics	(1)

Ref. No.		Part No.	Description	
• **Control Unit Section**				
50		SFAC109N03	Panel, Front	(1)
51		SFUM109N17	Glass, Front Panel	(1)
52		SFUM109N16	Frame, Control Section	(1)
53		SFUM109N18	Filter, Control Section	(1)
54		SFUM109N19E	Button, Control	(1)
55		SFUM109N20E	Button, Start, Stop	(1)
56		SFKT109N05	Button, Power Switch	(1)
57		SJT347	Terminal, Fuse	(8)
58		SFUM109N21	Shaft, Support	(2)
59		SFUM109N22	Shaft, Support	(2)
60		SFUP10914E	Cabinet	(1)
61 [EK] ⚠		SJA139	AC Cord	(1)
61 [XL] ⚠		SJAG23	AC Cord	(1)
61 [Other Areas] ⚠		SJA137	AC Cord	(1)
62 [EK]		SFSR5N–4	Bushing, AC Cord	(1)
62 [Other Areas]		SFSR4N–4	Bushing, AC Cord	(1)
63		SFDJ109N04E	Socket, (24P)	(1)
64		SFUP109N01	Bottom Cover	(1)
65 [E, EC]		SFNN109S01	Neme Plate	(1)
65 [EK,XL]		SFNN109G01	Name Plate	(1)
65 [XA, XM]		SFNN109X01	Name Plate	(1)
65 [Other Areas]		SFNN109R01	Name Plate	(1)
66		SKL261	Foot, Set	(6)
SCREWS, WASHERS AND NUTS				
N1	**S**	XTN3+10BFZ	Screw, ⊕ 3 x 10	(5)
N2	**S**	XSN3+6S	Screw, ⊕ 3 x 6	(2)
N3	**S**	XWA3B	Washer, φ3	(6)
N4	**S**	XTV3+8BFN	Screw, ⊕ 3 x 8	(9)
N5	**S**	XSN3+5S	Screw, ⊕ 3 x 5	(8)
N6	**S**	XWE3	Washer, φ3	(7)
N7		XVE4A12FN	Screw, ⊕ 4 x 12	(4)
N8	**S**	XWA4B	Washer, φ4	(4)
N9	**S**	XSN4+10S	Screw, ⊕ 4 x 10	(3)
N10	**S**	XWA4B	Washer, φ4	(3)
N11		XYN3+C40S	Screw, ⊕ 3 x 40	(3)
N12		SFX0109N01	Washer, φ3	(3)
N13		XSB3+35FZS	Screw, ⊕ 3 x 35	(3)
N14	**S**	XNG4ES	Nut, φ4	(1)
N15	**S**	XTV3+8BFZ	Screw, ⊕ 3 x 8	(39)
N16		XXE26D5FP	Screw	(3)
N17	**S**	XTN3+8BFZ	Screw, ⊕ 3 x 8	(5)
N18		XYN23+C10	Screw, ⊕ 2.3 x 10	(2)
N19		XTW3+10TFZ	Screw, ⊕ 3 x 10	(20)
N20	**S**	XNG3ES	Nut, φ3	(4)
N21		XSN3+8S	Screw, ⊕ 3 x 8	(4)

Ref. No.	Part No.	Description	
ACCESSORIES			
A1	SFNU109S01	Instructions Book	(1)
A2	SFNZ109M04	Caution Book	(1)
A3	SFW0010	Oil Kit	(1)
A4	SFWE010	Adaptor, 45 r.p.m.	(1)
A5	SFEL028–01E	Ground Wire	(1)
A6	SFXW650–2	Washer	(5)
A7	XSN5+60FZS	Screw	(5)
A8	XSN5+43FZS	Screw	(5)
A9	SFWZ109N01E	Handle, Turntable	(2)
A10	SFWZ109N02	Spanner, Turntable	(1)
A11 [XA] only ⚠	SFDKI19118	2P Plug	(1)
A12	SFWK109N01	Cloth, Cleaner	(1)
A13	SFNZ109M01	Mounting Map	(1)
A14	SFWZ109N03	Cleaner, Turntable	(1)
A15	SFHP109N02	Case, Cleaner	(1)
A16	SFNZ109N05	Label, Cleaner	(2)
PACKING PARTS			
P1 [EF]	SFHP109C01	Carton Box	(1)
P1 [Other Areas]	SFHP109M01	Carton Box	(1)
P2	SFHH109N01	Pad, Left Turntable	(1)
P3	SFHH109N02	Pad, Right Turntable	(1)
P4	SFHH109N03	Pad, Front Control Unit	(1)
P5	SFHH109N04	Pad, Rear Control Unit	(1)
P6	SFHD109N01	Pad, Top	(1)
P7	SFHD109N02	Pad, Turntable	(1)
P8	SFYF60A60	Polyethylene Bag, Turntable	(1)
P9	SFYF28A55	Polyethylene Bag, Control Unit	(1)
P10	SFYF45C50	Polyethylene Bag,	(1)
P11	SFYF10A30	Polyethylene Bag, AC Cord	(1)
P12	SFYF12A15	Polyethylene Bag, T–T Handle	(1)
P13	SFYF09A15	Polyethylene Bag Screws	(1)
P14	SFHZ109N01	Sheet, DC Cord	(1)
P15	SFYF17A25	Polyethylene Bag, DC Cord	(1)
P16	SFHD109N03	Pad, Side Control Unit	(1)
P17	SFHZ109N03	Anti-Rust Paper	(1)

■ PACKINGS



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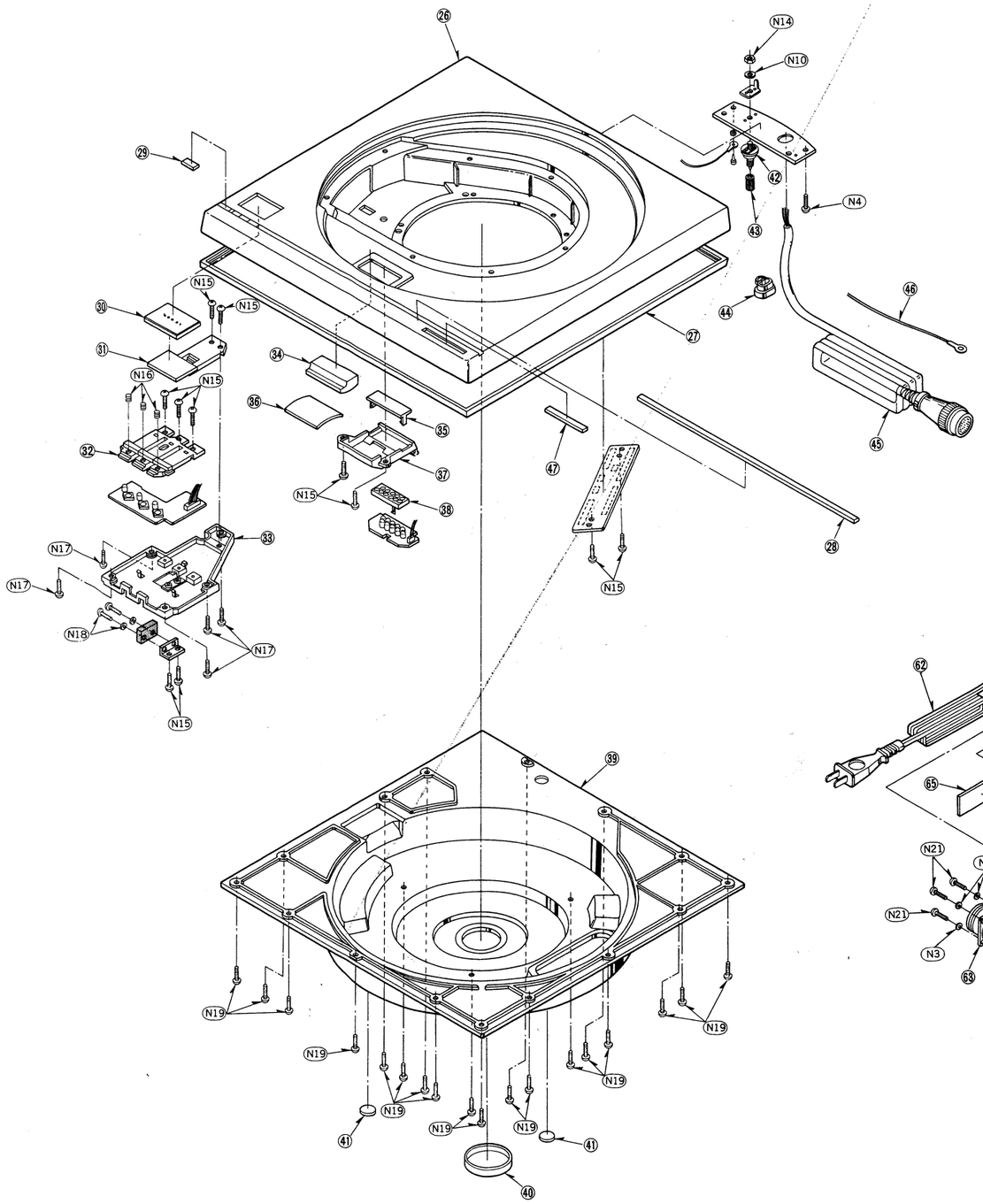
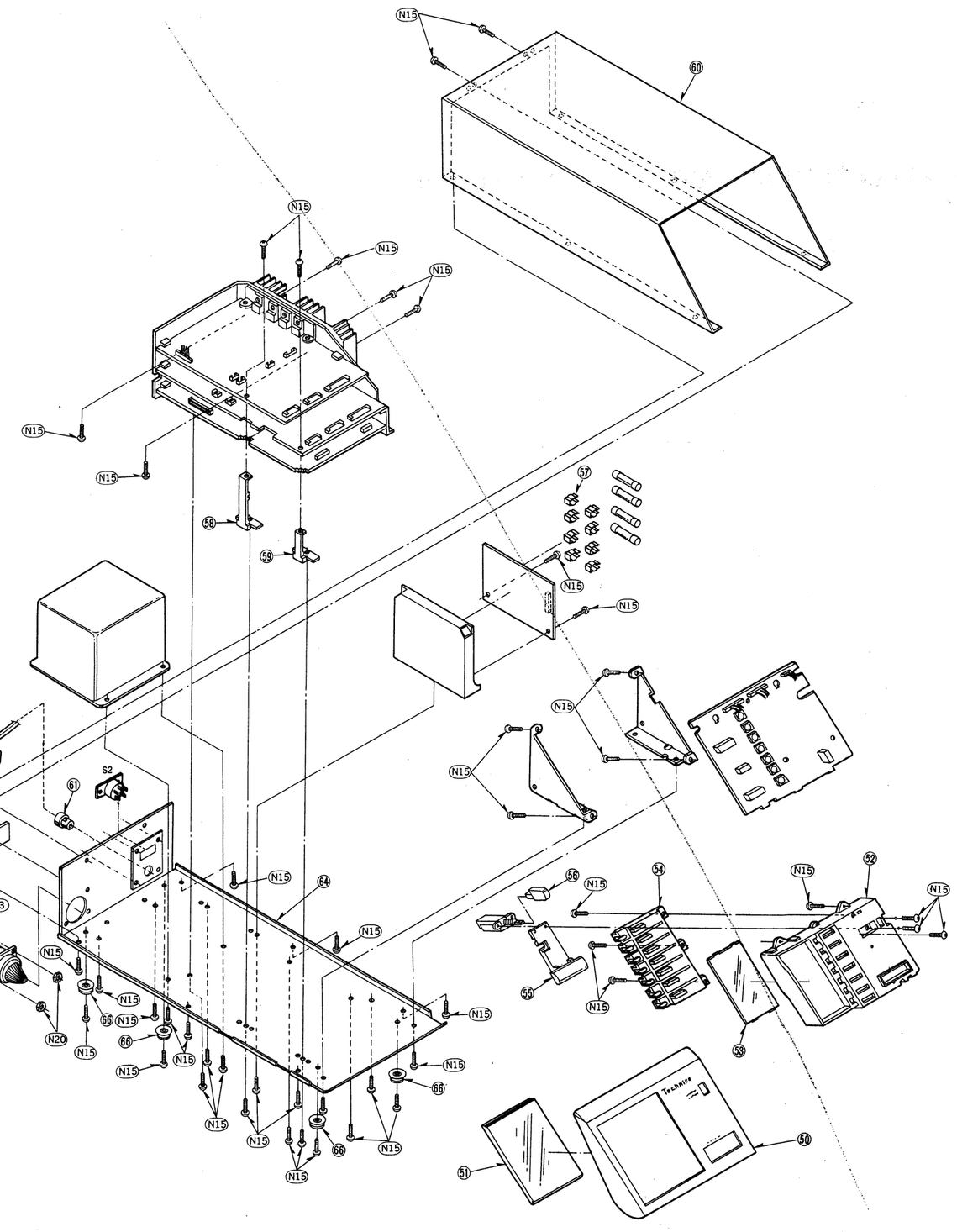
- Cabinet



- Control unit



■ RESISTORS & CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts.
Please use this part number for parts orders.
2. Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only, manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area.
Parts without these indications can be used for all areas.
4. The " **S** " mark is service standard parts and may differ from porduction parts.
5. Unless otherwise specified.
All resistors are in OHMS (Ω) K = 100Ω, M = 1000kΩ
All capacitors are in MICROFARADS (μF) P = μμF

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon	25 : 1/4W	J : ± 5%
ERG : Metal Oxide	50 : 1/2W	
ERX : Metal Film	1 : 1W	
	2 : 2W	

Ref. No.		Part No.	Value
RESISTORS			
R1	S	ERD25FJ102	1k
R2	S	ERD25FJ332	3.3k
R3	S	ERD25FJ152	1.5k
R4	S	ERD25FJ332	3.3k
R5	S	ERD25TJ273	27k
R6	S	ERD25FJ682	6.8k
R10	S	ERD25FJ103	10k
R11	S	ERD25FJ102	1k
R12, 13	S	ERD25FJ332	3.3k
R17	S	ERD25FJ103	10k
R18	S	ERD25FJ560	56
R19	S	ERD25FJ182	1.8k
R20	S	ERD25FJ122	1.2k
R21	S	ERX2ANJR68	0.68
R103	S	ERD25FJ102	1k
R104	S	ERD25TJ474	470k
R105	S	ERD25FJ472	4.7k
R106	S	ERD25TJ563	56k
R107	S	ERD25FJ101	100
R108	S	ERD25TJ473	47k

Ref. No.		Part No.	Value
R109	S	ERD25TJ393	39k
R110	S	ERD25TJ223	22k
R111	S	ERD25FJ562	5.6k
R113	S	ERD25FJ332	3.3k
R114	S	ERD25TJ183	18k
R115	S	ERD25FJ471	470
R116	S	ERD25FJ102	1k
R117	S	ERD25FJ562	5.6k
R118	S	ERD25FJ471	470
R119	S	ERD25FJ220	22
R120	S	ERD25FJ472	4.7k
R121	S	ERD25FJ103	10k
R122	S	ERD25FJ222	2.2k
R123	S	ERD25FJ470	47
R124, 125	S	ERD25FJ472	4.7k
R126	S	ERD25FJ222	2.2k
R127, 128	S	ERD25FJ103	10k
R129	S	ERD25TJ153	15k
R130	S	ERD25FJ102	1k
R132, 133	S	ERD25FJ103	10k
R133, 134	S	ERD25FJ103	10k

Ref. No.		Part No.	Value
R135, 136	S	ERD25FJ103	10k
R137, 138	S	ERG2ANJ150	15
R139	S	ERG2ANJ150	15
R140	⚠	ERD2FCG101	100
R141. 142	S	ERD25FJ151	150
R143, 144	S	ERD25FJ151	150
R145, 146	S	ERD25FJ151	150
R147	S	ERX2ANJR47	0.47
R148	S	ERG2ANJ271	270
R149	S	ERD25FJ103	10k
R150, 151	S	ERD25TJ393	39k
R152	S	ERD25TJ474	470k
R153	S	ERD25TJ104	100k
R154	S	ERD25FJ101	100
R155	S	ERD25FJ102	1k
R156	S	ERD25TJ473	47k
R157	S	ERD25FJ103	10k
R158	S	ERD25TJ564	560k
R159, 160	S	ERD25FJ103	10k
R161	S	ERD25FJ472	4.7k
R162	S	ERD25FJ471	470
R163	S	ERD25FJ152	1.5k

Ref. No.		Part No.	Value
R164	S	ERD25FJ332	3.3k
R201	S	ERD25FJ472	4.7k
R202	S	ERD25FJ471	470
R203	S	ERD25FJ222	2.2k
R204	S	ERD25TJ563	56k
R205, 205	S	ERD25TJ123	12k
R207	S	ERD25TJ123	12k
R208	S	ERD25TJ473	47k
R209	S	ERD25FJ103	10k
R210	S	ERD25TJ223	22k
R211	S	ERD25FJ332	3.3k
R212	S	ERD25TJ223	22k
R213	S	ERD25FJ822	8.2k
R214	S	ERD25TJ153	15k
R215	S	ERD25FJ472	4.7k
R224	S	ERD25TJ183	18k
R225	S	ERD25TJ333	33k
R226	S	ERD25TJ823	82k
R227, 228	S	ERD25TJ223	22k
R229	S	ERD25TJ273	27k
R231	S	ERD25TJ223	22k

Ref. No.		Part No.	Value
R303	S	ERD25FJ471	470
R304	S	ERD25TJ473	47k
R305	S	ERD25TJ823	82k
R306, 307	S	ERD25FJ562	5.6k
R308	S	ERD25FJ102	1k
R309	S	ERD25FJ332	3.3k
R310	S	ERD25FJ472	4.7k
R311	S	ERD25TJ563	56k
R321	S	ERD25FJ680	68
R322	S	ERD25FJ122	1.2k
R323, 324	S	ERD25FJ152	1.5k
R325	S	ERD25FJ152	1.5k
R326	S	ERD25FJ221	220
R327	S	ERD25FJ562	5.6k
R328	S	ERD25FJ103	10k
R329	S	ERD25FJ102	1k
R330	S	ERD25FJ392	3.9k
R331	S	ERD25FJ102	1k
R332	S	ERD25TJ183	18k

Ref. No.		Part No.	Value
R333, 334	S	ERD25FJ331	330
R335, 336	S	ERD25FJ331	330
R337, 338	S	ERD25FJ331	330
R339, 340	S	ERD25FJ331	330
R341, 342	S	ERD25FJ331	330
R343	S	ERD25FJ331	330
R344	S	ERD25FJ680	68
R360	S	ERD25TJ473	47k
R361	S	ERD25FJ101	100
R362	S	ERD25FJ391	390
R401, 402	S	ERD25FJ103	10k
R403	S	ERD25FJ103	10k
R404, 405	S	ERD25TJ153	15k
R406	S	ERD25TJ153	15k
R407, 408	S	ERD25TJ473	47k
R409	S	ERD25TJ473	47k
R411, 412	S	ERD25FJ103	10k
R413, 414	S	ERD25FJ103	10k

Ref. No.		Part No.	Value
R415, 416	S	ERD25FJ103	10k
R417, 418	S	ERD25FJ103	10k
R419	S	ERD25TJ153	15k
R420	S	ERD25FJ182	1.8k
R421	S	ERD25FJ101	100
R422	S	ERD25TJ333	33k
R423, 424	S	ERD25FJ103	10k
R425, 426	S	ERD25FJ103	10k
R427	S	ERD25TJ333	33k
R428, 429	S	ERD25TJ153	15k
R430	S	ERD25FJ562	5.6k
R431	S	ERD25TJ104	100k
R501, 502	S	ERD25FJ682	6.8k
R503	S	ERD25FJ682	6.8k
R505	S	ERD25FJ560	56
R506	S	ERD25FJ820	82
R508	S	ERD25FJ181	180
R601	⚠ S	ERD50FJ4R7	4.7

Numbering System of Capacitor

Example

ECKD	1H	103	Z	F	ECEA	50	M	R47	R
Type	Voltage	Value	Tolerance	Peculiarity	Type	Voltage	Peculiarty use	Value	Special use

Capacitor Type	Voltage (ECEA Type)	Voltage (Others)	Tolerance
ECEA : Electrolytic	1A : 10V	1H : 500V DC	J : ± 5%
ECEA...N : Non Polar Electrolytic	1C : 16V	2H : 500V DC	K : ± 10%
ECCD : Ceramic	1E : 25V	05 : 50V DC	M : ± 20%
ECKD : Ceramic	1V : 35V	1 : 125V DC	Z : + 80%, −20%
ECQM : Polyester	1H : 50V	1A : 125V AC	P : + 100%, −0%
ECQF : Polyester	1J : 63V		
ECQV : Polyester	50 : 50V		
ECEB : Electrolytic	25 : 25V		
ECQU : Polyester	2A : 100V		

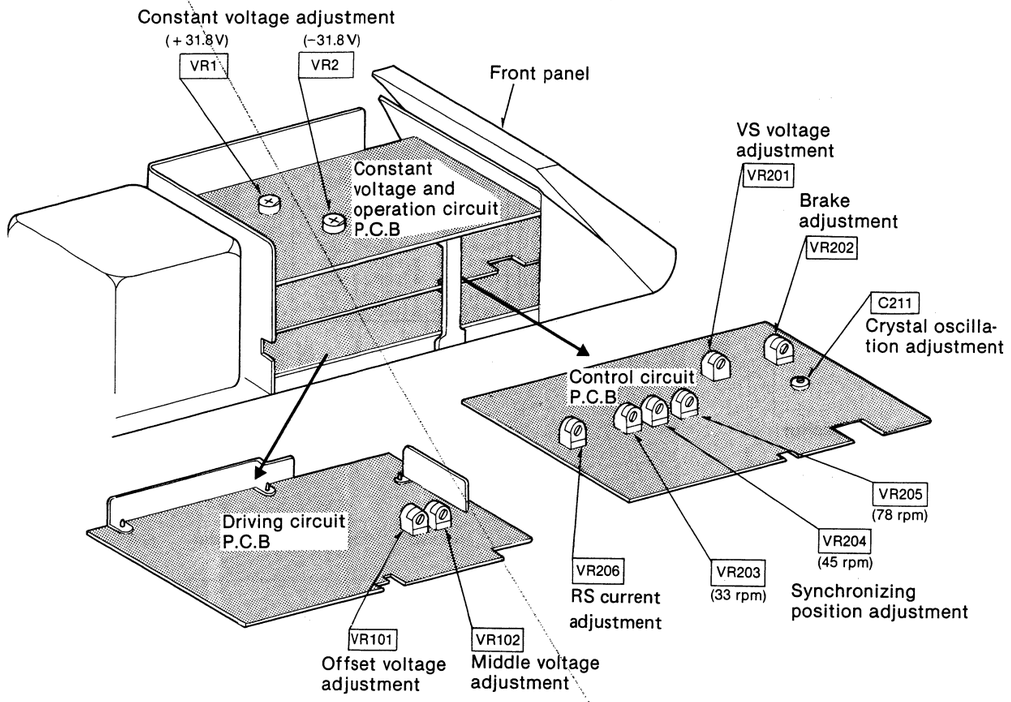
Ref. No.		Part No.	Value
CAPACITORS			
C1, 2	S	ECQM1223KZ	0.022
C3	S	ECEB1JS102	1000
C4	S	ECEA1JS470	47
C5	S	ECEA1HS470	47
C6	S	ECEB1JS102	1000
C7	S	ECEA1JS470	47
C8	S	ECEA1HS470	47
C9, 10	S	ECKD1H223PF	0.022
C11	S	ECEB1ES102	1000
C12	S	ECQM1H473JZ	0.047
C13	S	ECEA1CS331	330
C14, 15, 16	S	ECQM1H473JZ	0.047
C17	S	ECEA1AS101	100
C18	S	ECEA1AS221	220
C19	S	ECEA1HS100	10
C20	S	ECEA1AS470	47
C101	S	ECEA50Z2R2	2.2
C102, 103	S	ECEA50Z1	1
C104	S	ECEA1ES470	47
C105	S	ECEA50M1R	1
C106	S	ECEA50M2R2R	2.2
C107	S	ECEA50M1R	1

Ref. No.		Part No.	Value
C108	S	ECQM1H104JZ	0.1
C109	S	ECEA1CS331	330
C110	S	ECQM1H123JZ	0.012
C111	S	ECQM1H104JZ	0.1
C112	S	ECQM1H223JZ	0.022
C113	S	ECQM1H103JZ	0.01
C114	S	ECEA1VS330	33
C115	S	ECQM1H104JZ	0.1
C116, 117	⚠ S	ECEA1HN4R7S	4.7
C118	S	ECEA1ES101	100
C119	S	ECQM1H103JZ	0.01
C120	S	ECEA1HS100	10
C121, 122	S	ECQM1H103JZ	0.01
C123, 124	S	ECQM1H103JZ	0.01
C125, 126	S	ECQM1H103JZ	0.01
C127, 128	S	ECEA1JS470	47
C129	S	ECEA1JS470	47
130, 131	S	ECQM1H104JZ	0.1
C132	S	ECEA1ES101	100
C133	S	ECQM1H104JZ	0.1
C201	S	ECQM1H103JZ	0.01
C202	S	ECQM1H822JZ	0.0082
C203, 204	S	ECEA50M2R2R	2.2
C205	S	ECQM1H473JZ	0.047

Ref. No.		Part No.	Value
C206	S	ECEA1VS330	33
C207	S	ECEA50Z1	1
C208	S	ECCD1H331K	330p
C209	S	ECCD1H221K	220p
C210	S	ECCD1H220K	22p
C224	S	ECQV05154JZ	0.15
C225	S	ECQP1124JZ	0.12
C226	S	ECQM1H562JZ	0.0056
C227, 228	S	ECQM1H103JZ	0.01
C229	S	ECQV05154JZ	0.15
C230	S	ECQM1H154JZ	0.15
C232	⚠ S	ECEA1HN010S	1
C233, 234	S	ECQM1H104JZ	0.1
C235	S	ECQM1H103JZ	0.01
C236	S	ECEA1ES101	100
C237	S	ECEA1ES470	47
C238	S	ECQM1H222JZ	0.0022
C251	S	ECEA1AS101	100
C252, 253	S	ECKD2H102MD	0.001
C254, 255	S	ECEA50Z1	1
C257	S	ECQV05224JZ	0.22
C260	S	ECQM1H104JZ	0.1
C301	S	ECQM1H104JZ	0.1
C303, 304	S	ECQM1H102JZ	0.001

Ref. No.		Part No.	Value
C305	S	ECEA1HS100	10
C306	S	ECEA50Z1	1
C307	S	ECEA0JS471	470
C308	S	ECEA1AS221	220
C401	S	ECQM1H333JZ	0.033
C402	S	ECEA50Z1	1
C403	S	ECEA1HS100	10
C404	S	ECEA50Z1	1
C405	S	ECEA1HS100	10
C406	S	ECEA1CS330	33
C407	S	ECEA1HS100	10
C408, 409	S	ECQM1H103JZ	0.01
C410	S	ECQM1H103JZ	0.01
C411	S	ECKD1H102KB	0.001
C412	S	ECKD1H221KB	220p
C413	S	ECEA1AS101	100
C601	⚠	ECQU2A473MF	0.047
C602, 603	⚠ S	ECQM1223KZ	0.022
C604, 605	⚠ S	ECKD1H223PF	0.022

- **Adjustment points**



■ RESISTORS & CAPACITORS

Notes: 1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only, manufacturer's specified parts.
3. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
4. The "**S**" mark is service standard parts and may differ from porduction parts.
5. Unless otherwise specified.
All resistors are in OHMS (Ω) K = 100Ω, M = 1000kΩ
All capacitors are in MICROFARADS (μF) P = μμF

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value

Resistor Type			Wattage			Tolerance
ERD	:	Carbon	25	:	1/4W	J : ± 5%
ERG	:	Metal Oxide	50	:	1/2W	
ERX	:	Metal Film	1	:	1W	
			2	:	2W	

Ref. No.		Part No.	Value
RESISTORS			
R1	S	ERD25FJ102	1k
R2	S	ERD25FJ332	3.3k
R3	S	ERD25FJ152	1.5k
R4	S	ERD25FJ332	3.3k
R5	S	ERD25TJ273	27k
R6	S	ERD25FJ682	6.8k
R10	S	ERD25FJ103	10k
R11	S	ERD25FJ102	1k
R12, 13	S	ERD25FJ332	3.3k
R17	S	ERD25FJ103	10k
R18	S	ERD25FJ560	56
R19	S	ERD25FJ182	1.8k
R20	S	ERD25FJ122	1.2k
R21	S	ERX2ANJR68	0.68
R103	S	ERD25FJ102	1k
R104	S	ERD25TJ474	470k
R105	S	ERD25FJ472	4.7k
R106	S	ERD25TJ563	56k
R107	S	ERD25FJ101	100
R108	S	ERD25TJ473	47k

Ref. No.		Part No.	Value
R109	S	ERD25TJ393	39k
R110	S	ERD25TJ223	22k
R111	S	ERD25FJ562	5.6k
R113	S	ERD25FJ332	3.3k
R114	S	ERD25TJ183	18k
R115	S	ERD25FJ471	470
R116	S	ERD25FJ102	1k
R117	S	ERD25FJ562	5.6k
R118	S	ERD25FJ471	470
R119	S	ERD25FJ220	22
R120	S	ERD25FJ472	4.7k
R121	S	ERD25FJ103	10k
R122	S	ERD25FJ222	2.2k
R123	S	ERD25FJ470	47
R124, 125	S	ERD25FJ472	4.7k
R126	S	ERD25FJ222	2.2k
R127, 128	S	ERD25FJ103	10k
R129	S	ERD25TJ153	15k
R130	S	ERD25FJ102	1k
R132, 133	S	ERD25FJ103	10k
R133, 134	S	ERD25FJ103	10k

Ref. No.		Part No.	Value
R135, 136	S	ERD25FJ103	10k
R137, 138	S	ERG2ANJ150	15
R139	S	ERG2ANJ150	15
R140	⚠	ERD2FCG101	100
R141. 142	S	ERD25FJ151	150
R143, 144	S	ERD25FJ151	150
R145, 146	S	ERD25FJ151	150
R147	S	ERX2ANJR47	0.47
R148	S	ERG2ANJ271	270
R149	S	ERD25FJ103	10k
R150, 151	S	ERD25TJ393	39k
R152	S	ERD25TJ474	470k
R153	S	ERD25TJ104	100k
R154	S	ERD25FJ101	100
R155	S	ERD25FJ102	1k
R156	S	ERD25TJ473	47k
R157	S	ERD25FJ103	10k
R158	S	ERD25TJ564	560k
R159, 160	S	ERD25FJ103	10k
R161	S	ERD25FJ472	4.7k
R162	S	ERD25FJ471	470
R163	S	ERD25FJ152	1.5k

Ref. No.		Part No.	Value
R164	S	ERD25FJ332	3.3k
R201	S	ERD25FJ472	4.7k
R202	S	ERD25FJ471	470
R203	S	ERD25FJ222	2.2k
R204	S	ERD25TJ563	56k
R205, 205	S	ERD25TJ123	12k
R207	S	ERD25TJ123	12k
R208	S	ERD25TJ473	47k
R209	S	ERD25FJ103	10k
R210	S	ERD25TJ223	22k
R211	S	ERD25FJ332	3.3k
R212	S	ERD25TJ223	22k
R213	S	ERD25FJ822	8.2k
R214	S	ERD25TJ153	15k
R215	S	ERD25FJ472	4.7k
R224	S	ERD25TJ183	18k
R225	S	ERD25TJ333	33k
R226	S	ERD25TJ823	82k
R227, 228	S	ERD25TJ223	22k
R229	S	ERD25TJ273	27k
R231	S	ERD25TJ223	22k

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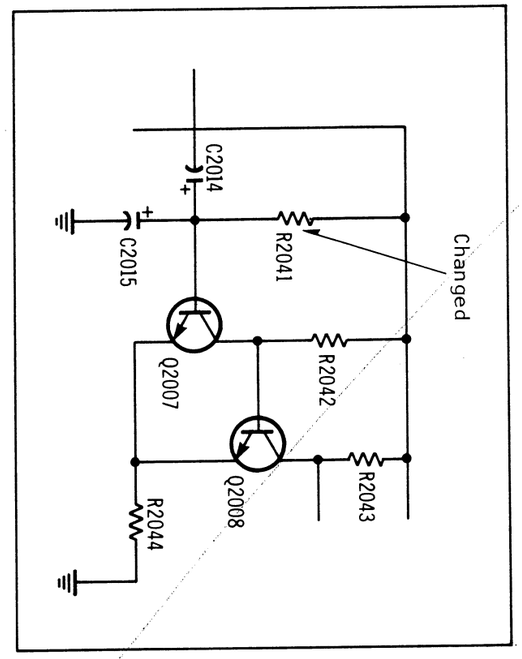
Ave. Victoria Carolina

motion of capstan motor under Search mode.

Remedy: A resistor (R2041) is changed as follows.

Ref. No.	Former Part No.	New Part No.
R2041	ERD25TJ105 (1/4watt, 1MΩ, carbon)	ERD25TJ684 (1/4watt, 680kΩ, carl



ECQV	:	Polyester	50	: 50V
ECEB	:	Electrolytic	25	: 25V
ECQU	:	Polyester	2A	: 100V

Ref. No.		Part No.	Value
CAPACITORS			
C1, 2	S	ECQM1223KZ	0.022
C3	S	ECEB1JS102	1000
C4	S	ECEA1JS470	47
C5	S	ECEA1HS470	47
C6	S	ECEB1JS102	1000
C7	S	ECEA1JS470	47
C8	S	ECEA1HS470	47
C9, 10	S	ECKD1H223PF	0.022
C11	S	ECEB1ES102	1000
C12	S	ECQM1H473JZ	0.047
C13	S	ECEA1CS331	330
C14, 15, 16	S	ECQM1H473JZ	0.047
C17	S	ECEA1AS101	100
C18	S	ECEA1AS221	220
C19	S	ECEA1HS100	10
C20	S	ECEA1AS470	47
C101	S	ECEA50Z2R2	2.2
C102, 103	S	ECEA50Z1	1
C104	S	ECEA1ES470	47
C105	S	ECEA50M1R	1
C106	S	ECEA50M2R2R	2.2
C107	S	ECEA50M1R	1

Ref. No.		Part No.	Value
C108	S	ECQM1H104JZ	0.1
C109	S	ECEA1CS331	330
C110	S	ECQM1H123JZ	0.012
C111	S	ECQM1H104JZ	0.1
C112	S	ECQM1H223JZ	0.022
C113	S	ECQM1H103JZ	0.01
C114	S	ECEA1VS330	33
C115	S	ECQM1H104JZ	0.1
C116, 117	⚠S	ECEA1HN4R7S	4.7
C118	S	ECEA1ES101	100
C119	S	ECQM1H103JZ	0.01
C120	S	ECEA1HS100	10
C121, 122	S	ECQM1H103JZ	0.01
C123, 124	S	ECQM1H103JZ	0.01
C125, 126	S	ECQM1H103JZ	0.01
C127, 128	S	ECEA1JS470	47
C129	S	ECEA1JS470	47
130, 131	S	ECQM1H104JZ	0.1
C132	S	ECEA1ES101	100
C133	S	ECQM1H104JZ	0.1
C201	S	ECQM1H103JZ	0.01
C202	S	ECQM1H822JZ	0.0082
C203, 204	S	ECEA50M2R2R	2.2
C205	S	ECQM1H473JZ	0.047

Ref. No.		Part No.	Value
C206	S	ECEA1VS330	33
C207	S	ECEA50Z1	1
C208	S	ECCD1H331K	330p
C209	S	ECCD1H221K	220p
C210	S	ECCD1H220K	22p
C224	S	ECQV05154JZ	0.15
C225	S	ECQP1124JZ	0.12
C226	S	ECQM1H562JZ	0.0056
C227, 228	S	ECQM1H103JZ	0.01
C229	S	ECQV05154JZ	0.15
C230	S	ECQM1H154JZ	0.15
C232	⚠S	ECEA1HN010S	1
C233, 234	S	ECQM1H104JZ	0.1
C235	S	ECQM1H103JZ	0.01
C236	S	ECEA1ES101	100
C237	S	ECEA1ES470	47
C238	S	ECQM1H222JZ	0.0022
C251	S	ECEA1AS101	100
C252, 253	S	ECKD2H102MD	0.001
C254, 255	S	ECEA50Z1	1
C257	S	ECQV05224JZ	0.22
C260	S	ECQM1H104JZ	0.1
C301	S	ECQM1H104JZ	0.1
C303, 304	S	ECQM1H102JZ	0.001

Ref. No.		Part No.	Value
C305	S	ECEA1HS100	10
C306	S	ECEA50Z1	1
C307	S	ECEA0JS471	470
C308	S	ECEA1AS221	220
C401	S	ECQM1H333JZ	0.033
C402	S	ECEA50Z1	1
C403	S	ECEA1HS100	10
C404	S	ECEA50Z1	1
C405	S	ECEA1HS100	10
C406	S	ECEA1CS330	33
C407	S	ECEA1HS100	10
C408, 409	S	ECQM1H103JZ	0.01
C410	S	ECQM1H103JZ	0.01
C411	S	ECKD1H102KB	0.001
C412	S	ECKD1H221KB	220p
C413	S	ECEA1AS101	100
C601	⚠	ECQU2A473MF	0.047
C602, 603	⚠S	ECQM1223KZ	0.022
C604, 605	⚠S	ECKD1H223PF	0.022

F I C H E N O. 1 6 1 3

I N D E X - I.

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M O D E L S P - 1 0 M K 3.	(E)(EK)(XL)(EB)(EG)(EH)(EF)(EI)(EC)(XA)(XM)	M O D E L L S P - 1 0 M K 3.

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